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ABSTRACT

This teacher's guide and student guide are designed to accompany a general mathematics textbook that contains supplemental readings, activities, and methods adapted for secondary students who have disabilities and other students with diverse learning needs. The materials are designed to help these students succeed in regular education content courses and include simplified text and smaller units of study. The curriculum correlates to Florida's Sunshine State Standards and is divided into the following 11 units of study: (1) whole numbers; (2) fractions; (3) decimals; (4) percents; (5) geometry; (6) measurement; (7) perimeter/area; (8) graphs; (9) central tendency; (10) integers; and (11) equations. For each unit, the teacher's guide includes a general description of the unit's content and the unit's focus. Key prerequisite skills for the students are also listed in this guide. A suggested order of nine teaching events for the unit is given in a scope and sequence chart. These nine events include: determining present level; introducing the concept; presenting vocabulary; conducting initial learning activity; presenting concepts and examples; addressing common errors; reinforcing skills; summarizing the lesson; and administering a

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posttest. Answer keys for the quizzes and activities sheets are also included. Appendices in the teacher's guide contain a chart describing standards and benchmarks. The student guide contains vocabulary lists, explanation of content, and practice exercises designed to evaluate comprehension. (CR)

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Building General Mathematics Skills.
Teacher's Guide [and Student Guide]. Revised.
Parallel Alternative Strategies for Students (PASS).

Beverly Owens, Amy Mitchell, and Sylvia Walford

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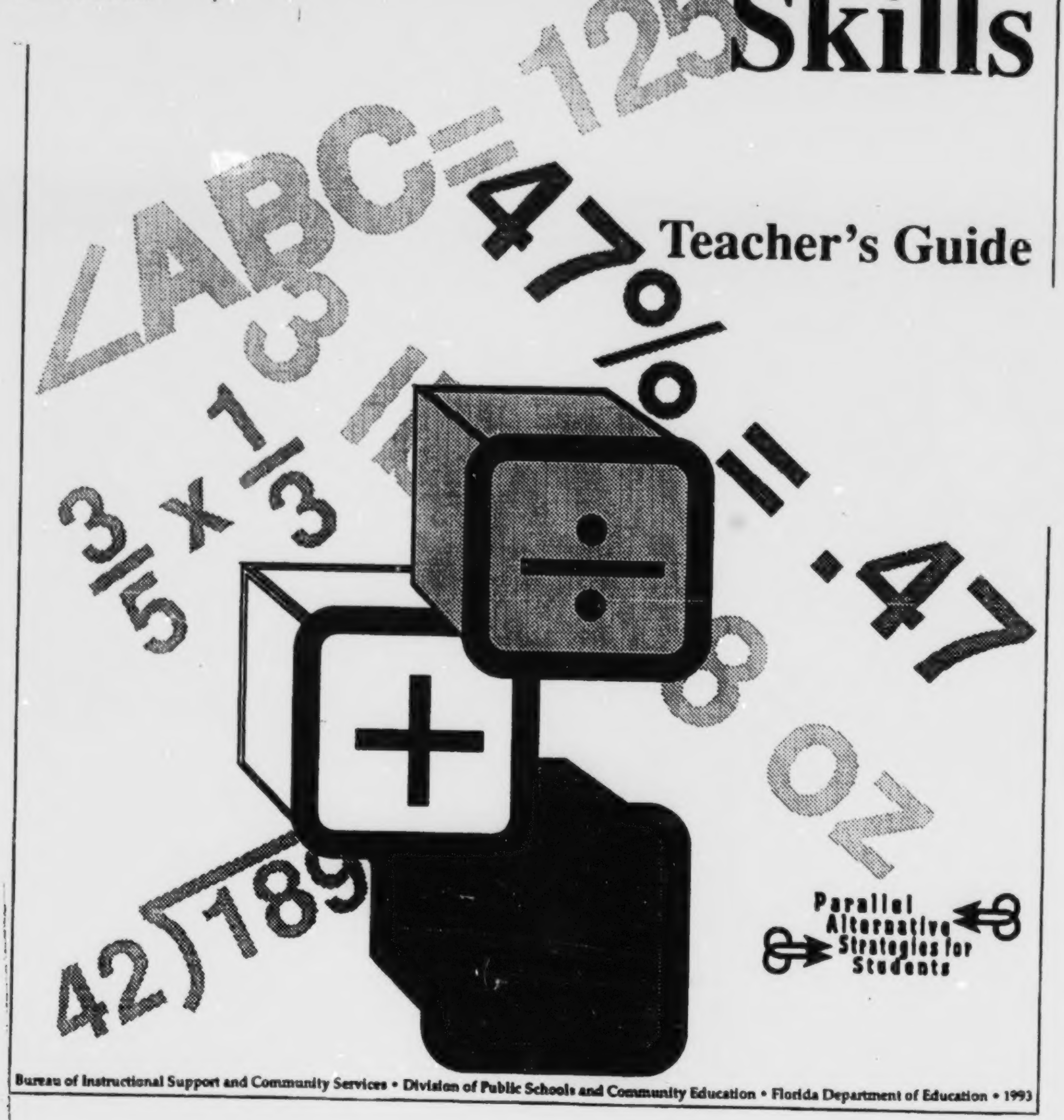

Teacher's Guide

Parallel
Alternative
Strategies for
Students

Bureau of Instructional Support and Community Services • Division of Public Schools and Community Education • Florida Department of Education • 1993

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Building General Mathematic Skills

Teacher's Guide

Bureau of Instructional Support and Community Services
Division of Public Schools and Community Education
Florida Department of Education

Reprinted 1998

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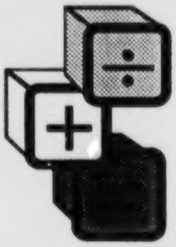

Building General Mathematic Skills

Teacher's Guide

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FOREWORD

Parallel Alternative Strategies for Students (PASS) books are content-centered packages of alternative methods and activities designed to assist secondary teachers to meet the needs of students of various achievement levels in the basic education content courses. Each *PASS* offers teachers supplementary activities and strategies to assist certain exceptional students and low achieving students in the attainment of the intended outcomes of a specific course.

The alternative methods and activities found in the *PASS* materials have been adapted to meet the needs of specific learning disabled and emotionally handicapped students mainstreamed in content classes. The *PASS* materials provide basic education teachers with a modified approach for presenting the course content that may be useful with mainstreamed exceptional students and other students with learning or behavior problems in their classrooms. The *PASS* materials also provide the exceptional education teacher, teaching subject area courses, with curriculum materials designed for these exceptional education students.

The initial work on *PASS* materials was done in Florida through Project IMPRESS, an EHA, Part B project funded to Leon County from 1981–1984. Four sets of modified content materials called *Parallel Alternate Curriculum* (*PAC*) were disseminated as Parts two–five of *Resource Manual, Volume V-F: An Interactive Model Program for Exceptional Secondary Students* (IMPRESS). Project IMPRESS patterned the *PACS* after the curriculum materials developed at the Child Service Demonstration Center at Arizona State University in cooperation with Mesa, Arizona Public Schools.

A series of 19 *PASS* volumes was developed by teams of regular and special educators from Florida school districts who volunteered to participate in the EHA, Part B Special Project, Improvement of Secondary Curriculum for Exceptional Students. This project was funded by the Florida State Department of Education, Bureau of Education for Exceptional Students to Leon County Schools from 1984–88 school years. Basic education subject area teachers and exceptional education teachers worked cooperatively to write, pilot, review, and validate the curriculum packages developed for the selected courses.

Continuation efforts have been maintained through the Curriculum Improvement Project. Beginning in 1989 the Curriculum Improvement Project contracted with Evaluation Systems Design, Inc., to design a revision process for the 19 *PASS* volumes. First, a statewide survey was disseminated to teachers and administrators in the 67 school districts to assess the usage of and satisfaction with the *PASS* volumes. Teams of experts in instructional design and teachers in the content area and in exceptional education then carefully reviewed and revised the *PASS* volumes according to the instructional design principles recommended in the recent research literature.

Neither the content nor the activities are intended to be a comprehensive presentation of any course. These *PASS* materials, designed to supplement the textbooks and other instructional materials, should not be used alone. Instead, they should serve as a stimulus for the teacher to design alternative strategies for teaching the student performance standards to the mastery level to the diverse population in a high school class.

Students with learning or behavior problems often require alternative methods of presentation and evaluation of important content. The content in *PASS* differs from the standard textbooks and workbooks in several ways: simplified text, smaller units of study, reduced vocabulary level, increased frequency of drill and practice, shorter reading assignments, clearer and more concise directions, less cluttered format, and the presentation of skills in small, sequential steps.

As supplementary material to augment the curriculum for exceptional sudents and other low achieving students, *PASS* may be utilized in a variety of ways. For example, some infusion strategies for incorporting this text into the existing program are as follows:

- additional resource to the basic text
- pre-teaching tool (advance organizer)
- post-teaching tool (review)
- alternative homework assignment
- alternate to a book report
- extra credit
- make-up work
- outside assignment
- individual contract
- self-help modules
- independent activity for drill and practice
- general resource material for small or large gorups
- assesment of student learning

The *PASS* is an attempt to provide some of the print modifications necessary for students with special needs to have successful classroom experiences. To increase student learning, these materials must be supplemented with additional resources that offer visual and auditory stimuli, including computer software programs, videotapes, audiotapes, and laser videodiscs.

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USER'S GUIDE

The *Parallel Alternative Strategies for Students (PASS): Building General Mathematic Skills* is designed as a supplementary text and workbook. *Building General Mathematic Skills* is divided into two books—one for the student and one for the teacher. Each book is divided into eleven units of study: Whole Numbers, Fractions, Decimals, Percents, Geometry, Measurement, Perimeter/Area, Graphs, Central Tendency, Integers, and Equations.

In the student's book, each unit contains a "Student's Guide" with a suggested plan for the unit. The guide presents each of the mathematic concepts with examples and problem-solving steps. Following the guide are the worksheets—comprised of quizzes, vocabulary (if applicable), study sheets, and activity sheets.

Each unit of the Teacher's Guide has an overview which lists the objectives and skills addressed. Key prerequisite skills for the student are also listed. A suggested order of nine teaching events for the unit or section is given in a scope and sequence chart. These nine events—i.e., determine present level, introduce the concept, present vocabulary, conduct initial learning activity, present concepts and examples, address common errors, reinforce skills, summarize the lesson, and administer posttest—are described more fully within the subsequent section called "Suggestions for Teaching," which is found in each section.

The answer keys for the quizzes and activity sheets are contained in each unit of the Teacher's Guide.

The learning activities were designed to be sufficiently general and adaptable enough to accompany other textbooks. The materials herein should not be viewed as a fixed curriculum. Sections may be selected and presented to coincide with the selected basic textbook or with the course outline. Other sections or activities may be eliminated, if desired.

This modified text presents only a limited sample of learning activities. The practice and application of the skills and concepts will necessarily include other supplemental materials. Teachers using these supplemental materials will want to provide a variety of opportunities to stimulate the students' interest and develop higher levels of cognition. The classroom experiences will be further enriched with the inclusion of multimedia materials—especially the microcomputer—and hands-on demonstrations, when possible.

The objectives and skills covered in this *PASS* are correlated to the units and listed in a correlation chart found in the Appendix. This group of skills was formerly the intended outcomes and student performance standards for the discontinued General Mathematics 1 course no. 1205340.

UNIT 1: WHOLE NUMBERS

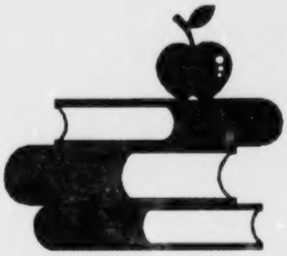
Section 1: Addition

Section 2: Subtraction

Section 3: Multiplication

Section 4: Division

Overview of Unit 1



What This Unit Covers...

Unit 1 provides instruction to assist students in performing mathematical operations with whole numbers. The objectives and skills for this unit are listed below.

Objective 1

Compute with whole numbers

Skills: Add no more than four numbers up to four digits, regrouping when necessary.

Subtract any two numbers up to four digits, regrouping when necessary.

Multiply a three-digit number by a two- or three-digit number.

Divide a four or five-digit number by a two-digit number including multiples of ten and one hundred.

Objective 2

Solve real-world problems

Skills: Solve real-world problems involving no more than two whole number operations.

Estimate answers to real-world problems involving whole numbers, common fractions, or decimal numbers.

UNIT 1: WHOLE NUMBERS

Unit 1 is comprised of four sections. The chart below displays the sections and concepts covered in each section for this unit.

Sections and Concepts of Unit 1

Sections	Concepts
Section 1	Adding whole numbers Rewriting in vertical form to add Working real-world word problems
Section 2	Subtracting whole numbers Working real-world word problems
Section 3	Multiplying with no regrouping Multiplying with regrouping Working real-world word problems
Section 4	Dividing whole numbers Working real-world word problems

Unit Components...

The Teacher's Guide for each section in Unit 1 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objectives
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement. and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary lists, and Activity Sheets are found in the student section.

Section 1: Addition of Whole Numbers

What This Section Is About...

In this section students will add as many as four whole numbers, with no more than four digits, regrouping when necessary.

Scope and Sequence of Section 1

Events	Activities
1. Determine present level.	Assign Quiz on prerequisites (p. 9). Assign Quiz as pretest (p. 10).
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary.	p. 11
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Adding whole numbers	p. 4
b. Rewriting in vertical form to add	p. 5
c. Working real-world problems	p. 6
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8 Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 10

Suggestions for Teaching...

Suggestions are provided below for teaching addition concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest. This is a two-part pretest, which includes a timed test of basic facts and a test related to the objectives and skills (pages 9 and 10).

Prerequisite Skills for Section 1

✓ State basic facts of addition.

✓ Identify place values through ten thousands.

2. Introduce.

☐ Discuss the origin of "counting."

Primitive man first counted using his fingers. However, this system only allowed him to count to ten. This system also required the caveman to remember the answer since it did not allow for any type of permanent record. Eventually, the caveman developed a simple counting system by making scratches on the walls of his cave. Each mark represented one animal that he had killed. This system became too difficult to read. Since there are no factual records pertaining to this period of time, we can assume that the next step in the development of a numerical system was the use of small pebbles to represent animals. We do know that the caveman eventually became a herder. As his herds grew larger and larger, he had to develop a more practical counting system—one that did not require carrying a heavy load of pebbles. By using a rock to represent a set number of smaller pebbles, the caveman's numerical system continued to become more sophisticated, and eventually evolved into our present day system.

☐ Concept of one-to-one correspondence

Present the concept of a one-to-one correspondence. In the previous discussion, the caveman's fingers and the animals counted were in one-to-one correspondence. One finger was used to represent one animal. Parents give their children different names so that no two children have the same name. This is also a one-to-one correspondence; call one name and one child answers. Now ask the student for additional examples of one-to-one correspondence (e.g., 4 apples for 4 people, 1 lunch ticket buys 1 lunch, etc.).

☐ What zero means

Ask the students what *zero* means. Stress that zero is a *placeholder* for place value systems.

There is no evidence that the earliest counting systems had a symbol to represent zero. They probably considered it foolish to have something represent nothing. Recently, archaeologists have found evidence that zero may have been invented as early as 330 B.C. Whatever the date, historians believe that zero was the last numeral to be invented.

☐ Infinity

Introduce the concept of infinity. If something cannot be counted, we say that it goes on to infinity. For example, the number of stars in the sky are considered to be infinite. The symbols for infinity are the lazy eight (∞) and ellipsis (...).

☐ Whole numbers

Briefly describe the set of whole numbers. By combining the numeral for zero with the counting numbers, we have a set of whole numbers (0, 1,...).

3. Present vocabulary concepts.

☐ Discuss vocabulary words and give examples. See student page 11 for definitions and examples.

- *carrying*
- *counting numbers*
- *finite*
- *infinite*
- *natural numbers*
- *one-to-one correspondence*
- *sum*
- *whole numbers*
- *zero*

☐ Assign vocabulary activity.

4. Conduct initial learning activity.

☐ Write the following examples on the board to get the students started on inventing their own numerical system. Let a star represent *one*, a triangle represent *two* and an arrow pointing to the right line represent *three*. So, star, triangle, arrow, all on the same line, represent the numeral 1 2 3 and, (arrow right) minus (triangle) equals (star). ★ ▲ → = 1 2 3 and → — ▲ = ★.

☐ Divide the students into groups of twos, threes, or fours. Have each group create its own numerical system with symbols. Allow only five minutes for this activity.

☐ Have a student from each group go to the board and write the numeral *35* , using his group's numerals. Discuss any similarity between systems after they have all been put on the board.

☐ Have another student from each group go to the board and write *24* in his group's numerals directly beneath the *35*.

☐ Ask for a volunteer from each group to add the two numbers on the board. Teachers must check with each group to see that the symbols used represent *59*.

☐ Have students do Activity Sheet on page 13 in groups.

5. Present each addition of whole numbers concept with examples.

Three concepts are presented in Section 1. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

❑ Assign Activity Sheets.

❑ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✘ Rewriting in vertical form incorrectly

$67 + 5 + 103$

$$\begin{array}{r} 67\\ 5\\ +\ 103\\ 823\\ \hline \end{array}$$

Drill that requires students only to write in vertical form–no computation.

✘ Forgetting to use the carried value

$$\begin{array}{r} {\scriptstyle 1}\\ 67\\ 5\\ +\ 103\\ 165\\ \hline \end{array}$$

Drill that requires the regrouped amount to be *written**–then crossed off when used.*

✘ Regrouping (carrying) to wrong place

Drill as above.

$$\begin{array}{r} {\scriptstyle 1}\\ 67\\ 5\\ +\ 103\\ 265\\ \hline \end{array}$$

7. Reinforce.

Selected reinforcement strategies are listed below.

✲ Have students play bingo, a *"race to the board"* game, or other game to practice basic facts.

- Have students practice basic addition facts, using microcomputer drill and practice programs.
- Provide an exercise which develops mental computation skills.
- Assign other activities to practice and reinforce, as needed.
- Give repeated timed tests, with the individual students charting their own results and progress.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on addition of whole numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Assign Quiz in student section, or use an alternate form, to assess skill mastery.

Section 2: Subtraction of Whole Numbers

What This Section Is About...

In this section, students will subtract whole numbers with as many as four digits, regrouping when necessary.

Scope and Sequence of Section 2

Events	Activities
1. Determine present level.	Assign Quiz on prerequisites (p. 25) and pretest (p. 26).
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary terms.	p. 27
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concept and examples.	Assign Activity Sheets.
a. Subtracting whole numbers	p. 22
b. Working real-world problems	p. 23
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 26

Suggestions for Teaching...

Suggestions are provided below for teaching subtraction concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest. This is a two-part pretest, which includes a timed test of basic facts and a test related to the objectives and skills (pages 25 and 26).

Prerequisite Skills for Section 2

✓ State basic facts of addition and subtraction.

✓ Identify place values through ten thousands.

2. Introduce.

☐ Discuss how the concept of subtraction may have originated.

Once the caveman began to use markings on the cave walls, he soon discovered that he needed a method to show that things had been taken away, like the loss of a family member, or the death of an animal. Solicit student input.

☐ Compare and contrast addition and subtraction concept.

Addition is a method of combining two or more objects or groups. You start with two or more numbers and put them together in a special way.

Subtraction, however, is an action upon one number (or group of objects). Start with a single number, and then remove part or all of it, using subtraction.

In addition, it doesn't matter what order you write your numbers. In subtraction, you must have the appropriate number written first. (This will become even more important later with integers.)

❑ Discuss subtracting whole numbers as it relates to the students' experience. Solicit student input.

Example: John had $9.00 and spent $6.00. How much did he have left? To find that out, we subtract. Write $9 – $6 = $3 or

$$\begin{array}{r} \$9 \\ -\ \$6 \\ \hline \$3 \end{array}$$

The result of subtraction is called the *difference*. To check, add the difference to the number subtracted. $9 – $6 = $3, because $3 + $6 = $9.

3. Present vocabulary concepts.

❑ Discuss vocabulary words and give examples.

- *borrowing*
- *difference*
- *renaming*
- *subtract*

❑ Assign vocabulary activity.

4. Conduct initial learning activity.

❑ Have students think of words that mean to subtract (e.g., take away, difference, less than, reduce by, minus, deduct, diminish, etc.).

❑ Discuss the many ways a particular problem may be orally expressed.

Example: 10 – 7
Ten subtract seven
Seven subtracted from ten
Ten minus seven
Ten less seven

Seven from ten
Difference between ten and seven
Ten reduced by seven
Reduce ten by seven
Ten take seven away, etc.

☐ Discuss related addition and subtraction facts (e.g., 3 + 4, 4 + 3, 7 − 3, 7 − 4).

5. Present each subtraction of whole numbers concept with examples.

Two concepts are presented in Section 2. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address Common Errors

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Borrowing from wrong place

Use manipulatives to demonstrate the process.

$$\begin{array}{r} \overset{5}{\cancel{6}}2\overset{1}{3} \\ -\,247 \\ \hline 6 \end{array}$$

✘ Forgetting that regrouping was done

$$\begin{array}{rccc} & & 1 & 1 \\ & 6 & 2 & 3 \\ - & 2 & 4 & 7 \\ \hline & 4 & 7 & 6 \end{array}$$

Use a drill that requires only regrouping "set-up"—no computation.

✘ Adding instead of subtracting

✘ Subtracting from top to bottom

7. Reinforce.

Selected reinforcement strategies are listed below.

✣ Have students play bingo, a *"race to the board"* game, or other games to practice basic facts.

✣ Have students practice basic subtraction facts, using microcomputer drill and practice programs.

✣ Assign other activities to practice and reinforce, as needed.

✣ Try a dictation drill using the various subtraction phrases mentioned in number 4 above with other numerals, to determine consistency of understanding.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on subtraction of whole numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Assign Quiz in student section, or use an alternate form, to assess skill mastery.

Section 3: Multiplication of Whole Numbers

What This Section Is About...

In this section students will multiply three-digit numbers by a two- or three-digit number.

Scope and Sequence of Section 3

Events	Activities
1. Determine present level.	Assign Quiz on prerequisites (p. 43) and pretest (p. 44).
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary terms.	p. 45
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concept and examples.	Assign Activity Sheets.
a. Multiplication with no regrouping	p. 36
b. Multiplication with regrouping	p. 38
c. Working real-world problems	p. 40
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 44

Suggestions for Teaching...

Suggestions are provided below for teaching multiplication concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest. This is a two-part pretest, which includes a timed test of basic facts and a test related to the objectives and skills (pages 43 and 44).

Prerequisite Skills for Section 3

✓ State basic facts of multiplication and addition.

✓ Identify place value through hundreds.

✓ Add up to four-digit numbers.

✓ Multiply three-digit by one-digit numbers.

✓ Apply multiplication properties of 0 and 1.

2. Introduce.

☐ Discuss rationale for learning by using examples relevant to students' experience. Solicit student input.

☐ Just as addition is a "short-cut" method of combining two numbers, multiplication is a short form of repeated addition.

We could count pebbles to add 23 to 47, but it is much quicker to add the *modern* way. We could count piles of pebbles to add 23, 23, 23, 23, 23, 23, and 23, but it is much quicker to multiply (23 x 7).

3. Present vocabulary concepts.

☐ Discuss vocabulary terms and give examples.

- *factors*
- *multiplication*
- *partial product*
- *product*

☐ Assign vocabulary activity.

4. Conduct initial learning activity.

☐ Have students complete the multiplication chart on page 47. Correct the tables and return them to the students for future reference.

☐ Discuss various symbols that may be used to show multiplication—i.e., x, •, ( ) ( ). Solicit student input.

5. Present each multiplication of whole numbers concept with examples.

Three concepts are presented in Section 3. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✘ Making computational errors	*Recheck work; use calculator.*
✘ Using an "old" carry at an inappropriate time	*Cross off the carried amount after using it.*

$$\begin{array}{r} 2\\ \cancel{1}\cancel{3}\\ 427\\ \underline{\times\quad 35}\\ 2135\\ \underline{1281} \end{array}$$

✘ Incorrect alignment of partial products	*Use graph paper or notebook paper turned sideways.*

$$\begin{array}{r} 427\\ \underline{\times\ 35}\\ 2135\\ \underline{1281} \end{array} \longleftarrow$$

✘ Carrying to wrong place or not carrying

$$\begin{array}{r} 1\swarrow\\ 135\\ \underline{\times\quad 3}\\ 495 \end{array}$$

✘ Forgetting to add amount carried

$$\begin{array}{r} 31\\ 135\\ \underline{\times\quad 3}\\ 395\\ \uparrow \end{array}$$

- ✘ Adding partial products incorrectly
- ✘ Multiplying the number carried
- ✘ Adding the number carried before multiplying

7. Reinforce.

Selected reinforcement strategies are listed below.

- ✣ Have students play bingo, or other games to practice basic facts.
- ✣ Have students practice basic multiplication facts, using microcomputer drill and practice programs and timed practice.
- ✣ Assign other activities to practice and reinforce, as needed.

8. Summarize.

Review the major points discussed in the Introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on multiplication of whole numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Assign Quiz in student section, or provide an alternate form, to assess skill mastery.

Section 4: Division of Whole Numbers

What This Section Is About...

In this section students will divide four or five-digit whole numbers by a two-digit number. The shortcut for dividing with powers of ten is included.

Scope and Sequence of Section 4

Events	Activities
1. Determine present level.	Assign Quizzes on prerequisites (pp. 61-62) and pretest (p. 63).
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary terms.	p. 64
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concept and examples.	Assign Activity Sheets.
a. Dividing whole numbers	p. 56
b. Solving real-world word problems	p. 59
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 63

Suggestions for Teaching...

Suggestions are provided below for teaching division concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills, including recall of basic division facts. Administer pretests, as needed. Pretests on prerequisite skills in this section include rounding numbers for estimation of quotient and subtraction of whole numbers. A quiz related to the objectives and skills is also included (pp. 61-63).

Prerequisite Skills for Section 4

- ✓ Perform simple operations of addition, subtraction, multiplication, and division.
- ✓ State the meaning of remainder in division.
- ✓ Round whole numbers.
- ✓ Estimate quotients.

2. Introduce.

☐ Discuss division as it relates to student experiences to develop rationale for learning. Solicit student input.

☐ Discuss concept of division as repeated subtraction (partitioning).

Example: How many complete packages of 7 pencils each can be made from a box of 144 pencils?

$$\begin{array}{r l} 144 & \\ -\ 7 & \quad \text{1st box} \\ \hline 137 & \end{array}$$

$$\begin{array}{r l} 137 & \\ -\ 7 & \quad \text{2nd box} \\ \hline 130 & \\ -\ 7 & \quad \text{3rd box} \\ \hline \end{array}$$

etc. Eventually, you'll find out how many boxes.

☐ Discuss concept of division as sharing or dealing—like cards.

Example: If you have an economy size bag of pens (72) to share among seven students equally, how many pens will each student get? "One for you, one for you, one for you... until you don't have enough left to make a full sweep again.

3. Present vocabulary concepts.

☐ Discuss vocabulary terms and give examples.

- *divide*
- *dividend*
- *divisor*
- *quotient*
- *remainder*
- *symbols for division*

☐ Assign vocabulary words and activity.

4. Conduct initial learning activity.

- ☐ Have students think of words that mean to divide (e.g., separate, portion, distribute, partition).
- ☐ Show the example: $5\overline{)100} = 20$
- ☐ Show the example: $3\overline{)10} = 3\frac{1}{3}$
- ☐ Stress that the remainder goes over the divisor as a fraction, if you plan to have students write them this way.
- ☐ Show the example: $15\overline{)210} = 140\frac{5}{15} = 140\frac{1}{3}$

  Note: This is an excellent example to show that the remainder over the divisor has to be reduced. See unit on fractions.

5. Present each division of whole numbers concept with examples.

Two concepts are presented in Section 4. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- ☐ Give rationale for learning the skill. Solicit students' input when developing rationale.
- ☐ Give steps in procedure.
- ☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- ☐ Present other examples and actively involve the student.
- ☐ Assign Activity Sheets.
- ☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Dividing by a number in the tens' place, but treating it as a number in the ones' place

Check to see if the answer is reasonable by estimating 20 x ***300*** *= 600 (?).*

$$\begin{array}{r} 320 \\ 20\overline{)640} \end{array}$$

The correct answer is 32. The student divided by "2" instead of "20".

✗ Omitting a zero as a place holder in the quotient, or including an extra zero in the quotient

Provide drill which has problems worked out but has many wrong answers. Have students "fix" by placing zeroes appropriately.

$$\begin{array}{r} 2\ 6 \\ 3\overline{)6\ 1\ 8} \end{array}$$

instead of 206

$$\begin{array}{r} 3084 \\ 21\overline{)8064} \end{array}$$

instead of 384

✗ Carrying the division problem out to the tenths' place without adding a decimal

Frequently review the fact that although the decimal point is not usually printed for a whole number, it does "belong" behind the far right digit of the whole number. Example: 46198 = 46198.

$$32\overline{)46198} =$$

$$\begin{array}{r} 14436\ \text{R}\ 28 \\ 32\overline{)461980} \\ -32 \\ \hline 141 \\ -128 \\ \hline 139 \\ -128 \\ \hline 118 \\ -96 \\ \hline 220 \\ -192 \\ \hline 28 \end{array}$$

✘ Estimate one less than the correct factor; then perform an extra division step

```
      810                          90
40 ) 3600     instead of   40 ) 3600
     320                         360
      40                          00
      40                           0
      00
       0
```

Lead a chalkboard drill: Choose estimates which you know will be insufficient. After each subtraction, compare the difference with the divisor before bringing down the next digit. Make new estimate and try again.

✘ Improper placement of the numbers when the original problem is written using ÷ sign

```
18 ÷ 6      18 ) 6
```

Provide mixed drill in which students are given problems in each form, and are required to rewrite in the alternate form.

✘ Writing the remainder to the right of the quotient to make a whole number

```
      2245     instead of  224  R 5
26 ) 5829
```

✘ Reversing the remainder and the quotient

✘ Multiplication or subtraction error

7. **Reinforce.**

Selected reinforcement strategies are listed below.

✱ Have students play bingo, a *"race to the board"* game, or other game to practice basic facts.

- Have students practice basic division facts, using microcomputer drill and practice programs.

- Assign other activities to practice and reinforce, as needed.

8. Summarize.

Review the major points discussed in the Introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on division of whole numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Assign Quiz in student section, or use an alternate form, to assess skill mastery.

UNIT 1: WHOLE NUMBERS

Answer Keys

Section 1: Addition

Page 9

10	8	8	7	15	11	14	15
4	12	12	13	3	16	9	8
7	10	11	2	10	5	7	12
5	3	10	9	4	14	17	6
10	6	14	13	9	8	9	8
18	10	17	4	12	10	11	16
5	14	6	10	13	5	10	7
6	7	11	11	8	13	11	7
9	14	11	12	15	8	12	11
12	6	13	6	9	15	13	16

Page 10

1. 670 2. 767 3. 889 4. 871
5. 676 6. 918 7. 678 8. 918
9. 1,546 10. 1,298 11. 842 12. 1,024
13. 10,235 14. 7,651 15. 5,929 16. 68
17. 71 18. 1,080 19. 2,139 20. 11,803
21. 219
22. 1,237
23. 12,361
24. 9,417
25. 10,918

Page 12

1. counting numbers or natural numbers
2. infinite
3. finite
4. whole numbers
5. carrying
6. sums
7. zero

Page 13

Answers will vary.

Page 14

1 21,040 2. 15,785
3. 6,635 4. 2.014
5. 7,616
6. 12,023
7. 9,094
8. 1,275
9. 6,667
10. 4,251

Page 15

1. 7,554 2. 3,278
3. 5,633 4. 7,387
5. 4,324 6. 8,270
7. 1,762 8. 8,368
9. 5,095 10. 9,490

UNIT 1: WHOLE NUMBERS Answer Keys

Section 1: Addition

Page 16	1.	283	2.	369
	3.	1,504	4.	1,536
	5.	2,263	6.	2,607
	7.	20,656	8.	17,024
	9.	22,514	10.	20,820

Page 17	1.	1,460
	2.	9,499
	3.	11,803
	4.	9,417
	5.	1,237
	6.	153
	7.	25,025
	8.	14,905
	9.	13,057
	10.	8,876

Page 19	1.	1,461
	2.	48,782
	3.	4,361
	4.	5,121
	5.	4,724

Section 2: Subtraction

Page 25	2	9	9	9	9	9	9	1
	8	8	9	3	8	9	4	6
	7	8	10	8	8	2	2	1
	6	1	7	8	8	8	7	2
	7	7	4	7	7	5	3	6
	5	6	5	6	5	3	2	1
	4	5	1	3	1	6	7	2
	3	5	4	6	4	1	2	7
	4	3	6	5	5	4	3	3
	2	3	4	1	2	5	4	6

Page 26	1.	522	2.	329	3.	596	4.	149
	5.	4,114	6.	4,423	7.	4,219	8.	4,451
	9.	5,851	10.	6,138	11.	7,715	12.	5,271
	13.	2,224	14.	3,571	15.	2,381	16.	3,754
	17.	4,548	18.	6,899	19.	6,203	20.	2,415
	21.	4091			22.	6,332		
	23.	88,421			24.	4,708		

Section 2: Subtraction

Page 28

1. N
2. S
3. S
4. N
5. S
6. N
7. S
8. S
9. N
10. S

Page 29

1. 7,332 2. 6,411 3. 4,227
4. 4,106 5. 3,370 6. 8,371
7. 571 8. 202 9. 1,463
10. 555 11. 7,122
12. 5,003 13. 3,363
14. 7,911 15. 749

Page 30

1. 806 2. 397 3. 199
4. 5,368 5. 2,326 6. 246
7. 2,991 8. 667 9. 5,336
10. 1,998 11. 712 12. 6,629
13. 8,559 14. 7,803 15. 1010

Page 31

1. 7,131 2. 8,211 3. 127
4. 599 5. 1,778 6. 5,070
7. 3,421 8. 713 9. 4,270
10. 1.177 11. 247
12. 1,313 13. 6,836
14. 2,147 15. 6,746

Page 32

1. 198 2. 668 3. 4,748 4. 487
5. 3,749 6. 228 7. 1,448 8. 1,676
9. 1,427 10. 288 11. 1,613 12. 5,659
13. 4,528 14. 308 15. 1,436 16. 6,339
17. 386 18. 7,827
19. 2,539 20. 109

Page 34

1. 1,274
2. 131,034
3. 2,382
4. 4,259
5. 58,240
6. 13,612
7. 15,621

Section 3: Multiplication

Page 43	54	81	36	63	32	40	72	9
	10	27	45	12	24	32	14	18
	48	24	8	72	56	35	21	64
	42	56	30	28	36	63	54	16
	45	25	21	6	18	14	24	42
	63	27	42	56	20	56	15	30
	28	20	4	16	63	6	54	12
	0	54	0	15	72	24	16	0
	54	18	0	12	45	10	40	12
	0	8	35	42	18	42	56	36

Page 44	1.	37,931	2.	21,658
	3.	32,670	4.	52,070
	5.	356,562	6.	683,571
	7.	656,952	8.	486,900

Page 46	1.	a) F	b) F	c) P		
	2.	d) F	e) F	f) P		
	3.	g) F	h) F	i) P		
	4.	j) F	k) F	l) PP	m) PP	n) F

Page 47 Table

Page 48	1.	68,373	2.	93,262
	3.	43,824	4.	25,652
	5.	73,926	6.	45,368

Page 49	1.	75,803	2.	8,862
	3.	42,622	4.	11,022
	5.	123,422	6.	9,933
	7.	44,511	8.	9,020

Page 50	1.	110,103	2.	150,384	3.	108,996
	4.	72,709	5.	58,443	6.	126,480
	7.	65,575	8.	108,934		
	9.	62,424	10.	77,112		

Page 51	1.	21,050	2.	18,795	3.	14,730	4.	30,000
	5.	24,645	6.	30,651	7.	22,672	8.	52,360
	9.	436,000	10.	11,575	11.	47,912	12.	33,165
	13.	32,340	14.	44,350	15.	10,920	16.	4475
	17.	46,767	18.	31,240	19.	22,680	20.	40,000

Section 4: Division

Page 52
1. 50,310 2. 23,572 3. 23,249 4. 52,432
5. 40,158 6. 29,716 7. 82,476 8. 48,300
9. 37,012 10. 110,838 11. 69,230 12. 65,520
13. 1,260 14. 1,120 15. 1,470 16. 1,120
17. 1,850 18. 250 19. 8,946 20. 34,632

Page 54
1. $1,300.00
2. $25,844
3. $2,149.00
4. 43,915 pounds
5. $720.00

Page 61
1. 80
2. 70
3. 20
4. 60
5. 80
6. 30
7. 80
8. 90
9. 90
10. 40
11. 598 12. 6,109

Page 62
1. 38,038 2. 3,149
3. 41,381 4. 2,521
5. 86 6. 156
7 516 8. 15,741

Page 63
1. 3 2. 300
3. 2240 4. 134 R 13
5. 1111 6. 428
7. 5387 R 8 8. 2,339 R 8
9. 45 R 9 10. 1,152

Page 65
1. a. DV b. D c. Q
2. d. DV e. D f. Q
3. g. D h. Q i. DV
4. j. DV k. D l. Q m. R n. D

Page 66
1. 2 R 10 2. 31
3. 126 R 14 4. 1,020 R 16
5. 2 R 4 6. 10 R 40
7. 180 8. 843 R 60
9. 3 R 15 10. 23 R 8

Section 4: Division

Page 67	1.	71	2.	568		
	3.	18 R 4	4.	15 R 9		
	5.	240	6.	7		
	7.	375 R 7	8.	115 R 22		
	9.	143 R 4	10.	173 R 40		
Page 68	1.	624 R 24	2.	603 R 36		
	3.	845 R 18	4.	714 R 21		
	5.	696 R 56	6.	824 R 52		
	7.	298 R 28	8.	354 R 72		
	9.	901 R 12	10.	376 R 26		
Page 69	1.	960	2.	690		
	3.	308	4.	1,294 R 2		
	5.	21 R 34	6.	102 R 57		
	7.	2,576	8.	2,083 R 31		
	9.	3,211	10.	3,059 R 14		
Page 70	1.	4 R 6	2.	92 R 18	3.	368 R 1
	4.	10 R 8	5.	2 R 17	6.	121 R 1
	7.	45	8.	59 R 9	9.	145 R 7
	10.	145	11.	59 R 13	12.	86 R 72
Page 72	1.	228 sheets of paper				
	2.	68 boxes, 1 baseball left				
	3.	893 hours				
	4.	$30.00				
	5.	$1,200.00				
	6.	456 miles				
	7.	1,095 days				

UNIT 2: FRACTIONS

Section 1: Addition

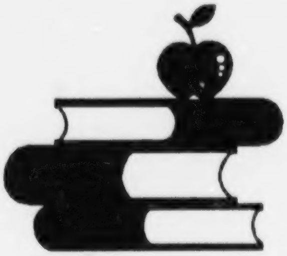
Section 2: Subtraction

Section 3: Multiplication

Section 4: Division

Overview of Unit 2

What This Unit Covers...



Unit 1 provides instruction to assist students in performing mathematical operations with fractions. The objectives and skills for this unit are listed below.

Objective 1

Compute with fractions

Skills: Add fractions, including whole numbers and mixed numbers less than 100, and proper fractions with denominators 2, 3, 4, 5, 6, 8, or 10.

Subtract fractions, including whole numbers and mixed numbers with denominators 2, 3, 4, 5, 6, 8, 10.

Multiply fractions, including mixed numbers less than 100, with denominators less than 10.

Divide fractions, including mixed numbers less than 100 with denominators less than 10.

Objective 2

Solve real-world problems

Skills: Solve real-world problems involving fractions with unlike denominators of 2, 3, 4, 5, 6, 8, or 10.

Unit 2 is comprised of four sections. The following chart displays the sections and concepts covered in each section for this unit.

UNIT 2: FRACTIONS

Sections and Concepts of Unit 2

Sections	Concepts
Section 1	Simplifiying fractions
	Adding like fractions
	Finding common denominators
	Adding fractions with unlike denominators
	Renaming improper fractions as mixed numbers
	Adding fractions with unlike denominators whose sum is an improper fraction
Section 2	Subtracting proper fractions
	Subtracting whole numbers from mixed numbers
	Subtracting mixed numbers from whole numbers
	Subtracting mixed numbers from mixed numbers
Section 3	Renaming a mixed number as an improper fraction
	Multiplying two fractions
	Multiplying two fractions, using cross cancelling
	Multiplying fractions, mixed numbers, and whole numbers
Section 4	Dividing two fractions
	Dividing a fraction and a whole number
	Dividing two mixed numbers

Unit Components...

The Teacher's Guide in each section of Unit 2 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objectives
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

Section 1: Addition of Fractions

What This Section Is About...

In this section students will practice addition of fractions. The operations of simplifying, finding common denominators, finding equivalent fractions, and renaming as mixed numbers are included to enable the student to add like and unlike fractions. Sums include both proper and improper fractions.

Scope and Sequence of Section 1

Events	Activities
1. Determine present level.	Assign Quizzes (pp. 85-87).
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary.	pp. 88-89
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Simplifying	p. 76
b. Adding like fractions	p. 77
c. Finding common denominators	p. 78
d. Adding fractions with unlike denominators	p. 80
e. Renaming improper fractions as mixed numbers	p. 81
f. Adding fractions with unlike denominators whose sum is an improper fraction	p. 82
6. Address common errors.	See Suggestions for Teaching.
7 Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	pp. 85-87

Suggestions for Teaching...

Suggestions are provided below for teaching the addition of fractions concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest (pp. 1 and 2).

Prerequisite Skills for Section 1

- ✓ Add whole numbers.
- ✓ Define fraction and mixed number.
- ✓ Identify a fraction that is equivalent to a given proper fraction having a denominator of 2, 3, 5, 6, 8, and 10.
- ✓ Multiply and factor whole numbers.

2. Introduce.

- ☐ Provide rationale for learning by using examples from students' experiences that are relevant. Solicit student input.
- ☐ It is important that the student have a well-founded concept of fractions. Use models such as fraction bars (made of paper strips), Cuisenaire Rods, or Unifix cubes to demonstrate addition of fractions with common denominators. Using manipulative aids to demonstrate fractional parts will facilitate concept development. Special transparencies for the overhead projector would be a good tool for upper level students.

For adding unlike fractions, the mechanics of pushing together two "fractions" may be simple; however, coming up with an appropriate name for the resulting amount (fraction) poses a problem. This may create a *need* in the student for a method to determine that name.

Fractions are used in many ways. Identify some of these through a brainstorming activity to show the relevance and importance of common fractions. Common classifications include:

- As a part-to-whole comparison, (e.g., 3 of 12 portions of a Hershey bar have been eaten).
- As a ratio–a comparison of two numbers (e.g., 4 out of 5 dentists recommend *Fresh* toothpaste; number of boys and number of girls in a room).
- As a quotient or indicated division, (e.g., $\frac{32}{6}$ means $6\overline{)32}$ or $32 \div 6$)

  Example: 4 cookies, 3 children—if shared equally... $\frac{4}{3}$
- As an operator (e.g., think of 3/4 as a "3 for 4" machine, where an input of 4 gives an output of 3 (a kind of "stretcher—shrinker" notion).
- As a measure—how much there is of a quantity relative to a specified unit of that quantity. (e.g., $\frac{2}{3}$ of a package of *gummy bears* or notebook paper).
- As rate (e.g., speed is relationship between distance and time; wages between dollars and hours).

Note: Deliberate teaching for transfer is recommended to facilitate learning.

3. Present vocabulary concepts.

☐ Discuss vocabulary terms and give examples.

- *common factor*
- *denominator*
- *factors*
- *fraction*
- *greatest common factor (GCF)*
- *improper fraction*
- *least common denominator (LCD)*
- *like fractions*
- *lowest terms*
- *mixed number*
- *multiples*
- *numerator*
- *proper fraction*
- *simplify*
- *unlike fractions*

☐ Assign vocabulary activity (pp. 88-89).

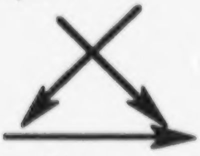
4. Conduct initial learning activity.

☐ For addition of fractions with unlike denominators, show students the following method, called the *teepee method.* The *teepee method* is a way to create a common denominator easily and set up the addition of fractions with unlike denominators. (Stress that although it is not necessary to use the least common denominator, it does make it easier to simplify later.) This method can also be used for subtracting fractions and determining the larger of two fractions. It can only be used when problems are written in horizontal form.

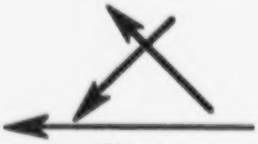
Method:

- Make a teepee using three arrows. The arrows may not face left or point down. (Wait until this task is accomplished)

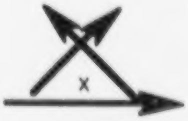
Examples:



Wrong



Wrong



Right

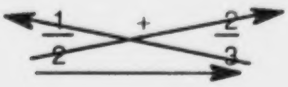
- Stress the importance of having the arrows point in the proper directions.
- Now, use a small x to make a doorway, and to indicate multiplication.
- Put this example on the board.

$$\frac{1}{2} + \frac{2}{3}$$

- Now, follow the arrows and multiply each set of numbers.

$3 \times 1 = 3$, $2 \times 2 = 4$ and $2 \times 3 = 6$

- Draw your arrows on the top of the problem like this:



$$= \frac{3+4}{6} \text{ or } \frac{7}{6} = 1\frac{1}{6}$$

The bottom arrow gives a common denominator. Others give numerators.

☐ Use manipulatives or pictures, if needed, to help students visualize.

5. Present each addition of fractions concept with examples.

Six concepts are presented in Section 1. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Present examples showing fractions with one as the GCF and showing the following cases:

1. Even numbers are those that end in 0, 2, 4, 6, or 8. The following numbers are even: 20, 32, 54, 106, 2018. *All* even numbers are divisible by 2. Therefore, if the numerator and denominator are both even—they are both divisible by 2.
2. Numbers that end in 0 or 5 are multiples of 5. If both the numerator and denominator end in 0 or 5, 5 can be used to reduce the fraction.

3. To determine if a fraction can be reduced by 3, see if the digits in the number add up to equal a multiple of 3. When using any of the strategies for Cases 1, 2, and 3, the student needs to be aware that they may need to reduce several times.

- ☐ Give rationale for learning the skill. Solicit students' input when developing rationale.
- ☐ Give steps in procedure.
- ☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- ☐ Present other examples and actively involve the student.
- ☐ Assign Activity Sheets.
- ☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✘ Renaming incorrectly

Example: $\frac{2}{3} = \frac{5}{15}$ or

$\frac{2}{3} = \frac{2}{15}$ or

$\frac{2}{3} = \frac{5}{15}$

Use physical models to verify mechanical process of renaming. Encourage temporarily writing out the thought process:

$$\frac{2}{3} = \frac{2 \times 5}{3 \times 5} = \frac{10}{15}$$

✘ Using either one of the unlike denominators and adding the numerators.

This may arise from a poor concept of fractions. Review.

Example:

$$\begin{array}{r} 85\frac{3}{8} \\ +\ 46\frac{2}{5} \\ \hline 131\frac{5}{8} \end{array}$$

✘ Reducing and/or regrouping the answer incorrectly or failing to reduce

When renaming fractions (either finding an equivalent or reducing) it's often helpful to introduce the idea of multiplying or dividing by a fraction equal to one. To multiply or divide by one (1) does not change the value.

Example: $\frac{2}{3} = \frac{?}{12}$

$$\frac{2}{3} \times = \boxed{1} = \frac{?}{12}$$

$$\frac{2}{3} \times \boxed{\frac{4}{4}} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$

Example: $\frac{10}{15} = \frac{?}{3}$

$$\frac{10}{15} \div \boxed{1} = \frac{?}{3}$$

$$\frac{10}{15} \div \boxed{\frac{5}{5}} = \frac{10 \div 5}{15 \div 5} = \frac{2}{3}$$

- ✘ Reducing and/or regrouping the answer incorrectly, or failing to reduce.

  Example:

$$\frac{8}{12} \div \frac{2}{4} = \frac{4}{3} \text{ or}$$

$$\frac{8}{12} \div \frac{4}{3} = \frac{2}{4} \quad \text{or}$$

$$45\frac{3}{2} = 46\frac{1}{2}$$

Review reading mixed numbers, (e.g., Forty-five and three-halves is equal to forty-five and one and one-half, which is equal to forty-six and one-half).

- ✘ Adding both numerators and denominators

  Example:

$$\begin{array}{r} 67\frac{1}{5} \\ +12\frac{3}{5} \\ \hline 79\frac{4}{5} \end{array} \quad \text{or} \quad \begin{array}{r} 27\frac{1}{6} \\ +58\frac{3}{8} \\ \hline 85\frac{4}{14} \end{array}$$

This may have as its source poor fraction concept. Model addition of fractions using manipulatives.

7. Reinforce.

Selected reinforcement strategies are listed below.

- ✣ Have students practice basic addition facts, using microcomputer drill and practice programs.
- ✣ Assign other activities to practice and reinforce, as needed.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on addition of fractions; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in the student section, or use an alternate form, to assess skill mastery.

Section 2: Subtraction of Fractions

What This Section Is About...

In this section students will practice subtracting fractions and mixed numbers. Some of the skills learned in the previous section will also be applied here, such as finding common denominators, renaming fractions, and simplifying fractions.

Scope and Sequence of Section 2

Events	Activities
1. Determine present level.	Assign Quiz on p. 119.
2. Introduce.	See Suggestions for Teaching.
3. Review vocabulary terms.	
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Subtracting proper fractions	p. 110
b. Subtracting whole numbers from mixed numbers	p. 111
c. Subtracting mixed numbers from whole numbers	p. 112
d. Subtracting mixed numbers from mixed numbers	p. 113
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 119

Suggestions for Teaching...

Suggestions are provided below for teaching subtraction concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer quiz as a pretest (p. 119).

Prerequisite Skills for Section 2

- ✓ Subtract whole numbers.
- ✓ Show the relationship between the whole number part and the fractional part of a mixed number.
  Recognize that: $1 = \frac{2}{2}, \frac{3}{3}, \frac{4}{4}$ etc.
- ✓ Simplify fractions.

2. Introduce.

Provide rationale for learning by using real-life reasons for learning fractions. For example, language used every day is filled with references to fractional amounts—"She took off work three-quarters of an hour early." (So, how long *did* she work that day?) Carpenters and seamstresses often need to subtract fractions, since their materials are most commonly measured with customary units (in the United States). Occasionally, a recipe will be written in such a way that the user must subtract some fraction from another.

Comparing customary measures usually requires such skill. In fact, subtracting time (hours, minutes, and seconds) is an extension of the concept of subtraction of fractions.

3. Review vocabulary concepts.

☐ Review vocabulary terms from Unit 1 Section 2, subtraction of whole numbers and give examples.

- *borrowing*
- *difference*
- *renaming*
- *subtract*

☐ Provide additional practice and reinforcement, as needed.

4. Conduct initial learning activities.

☐ Review the "Teepee" using Unit 2, Section 1: Addition, but this time rather than adding the two top numbers, subtract them. Then reduce the answers to lowest terms.

Use example: $\frac{2}{3} - \frac{1}{2} =$

Stress that this can only be used when dealing with just two fractions. When 3 or more fractions are used, the conventional method of finding a common denominator should be used.

☐ Model several problems using fractions bars or some other manipulative aid. Begin with fractions having the same denominator, progressing to mixed numbers with unlike denominators and needing regrouping.

Examples: $\frac{7}{8} - \frac{3}{8}$ (without renaming)

$\frac{7}{8} - \frac{3}{4}$ (with renaming)

$2\frac{7}{8} - 1\frac{1}{4}$ (renaming, no regrouping)

$4\frac{1}{3} - 1\frac{2}{3}$ (no renaming, with regrouping)

$3\frac{5}{8} - 1\frac{3}{4}$ (renaming, with regrouping)

- ☐ Stress that when regrouping to subtract, care must be taken to borrow one whole number and choose the best *name* for the borrowed amount.

$$\begin{array}{rcrcr} 4\frac{1}{3} & & \overset{3}{\cancel{4}}\ \frac{1}{3}+\frac{3}{3} & = & 3\frac{4}{3} \\ -1\frac{2}{3} & \rightarrow & 1\frac{2}{3} & & -1\frac{2}{3} \\ \hline \end{array}$$

$4\frac{1}{3}$ needs to be regrouped

$$4\frac{1}{3} = 3 + 1 + \frac{1}{3} = 3 + \frac{3}{3} + \frac{1}{3} = 3\frac{4}{3}$$

Compare and contrast regrouping with whole numbers to regrouping with fractions.

5. **Present each subtraction of fractions concept with examples.**

Four concepts are presented in Section 2. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- ☐ Give rationale for learning the skill. Solicit students' input when developing rationale.
- ☐ Give steps in procedure.
- ☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- ☐ Present other examples and actively involve the student.
- ☐ Assign Activity Sheets.
- ☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✘ Subtraction fact error	*Review and drill basic subtraction facts.*
✘ Failing to regroup	*Model the regrouping process using manipulatives; present drill which requires only set-up of each problem, and/or drill which requires decision-making (to regroup or not to regroup) and set-up.*
✘ Adding instead of subtracting	*Present randomly mixed drill with simple addition and subtraction problems (maybe with multiplication and division also) to facilitate attention to operation specified.*
✘ Subtracting the whole numbers only	*Model the process using manipulatives and mimicking the paper-and-pencil routine. Remind students that as in regular subtraction with whole numbers the work progresses from right to left.*
✘ Subtracting the whole numbers only	*Model the process using manipulatives, with a focus on the physical inability to take fractional part from an (unpartitioned) whole.*
✘ Incorrectly subtracting smaller from larger, instead of regrouping *Example:* $\begin{array}{r} 84\frac{1}{5} \\ +17\frac{4}{5} \\ \hline 67\frac{3}{5} \end{array}$	*To show an attempt take 4/5 of a candy bar when all you have is a 1/5 of it (or a similar model.) Provide drill which focuses only on the decision to regroup or not to regroup.*

7. Reinforce.

Selected reinforcement strategies are listed below.

- Have students play bingo, a *"race to the board"* game, or other games to practice basic facts.
- Have students practice basic subtraction facts, using microcomputer drill and practice programs.
- Assign other activities to practice and reinforce, as needed.
- Use manipulatives, pictures, and games to reinforce.
- Allow students to independently correct (anonymous) classwork of other students.

8. Sum up with post-organizer.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on subtraction of fractions; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in the student section, or use an alternate form, to assess skill mastery.

Section 3: Multiplication of Fractions

What This Section Is About...

In this section students will practice multiplying fractions, mixed numbers, and whole numbers. Cancelling and renaming mixed numbers as improper fractions are involved in the operation of multiplication.

Scope and Sequence of Section 3

Events	Activities
1. Determine present level.	Assign Quiz p. 137.
2. Introduce.	See Suggestions for Teaching.
3. Review vocabulary terms.	
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples	Assign Activity Sheets.
a. Renaming a mixed number as an improper fraction	p. 130
b. Multiplying two fractions	p. 130
c. Multiplying two fractions, using cross cancelling	p. 131
d. Multiplying fractions, mixed numbers, and whole numbers	p. 133
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p.137

Suggestions for Teaching...

Suggestions are provided below for teaching multiplication concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer Quiz as a pretest (p. 137).

Prerequisite Skills for Section 3

- ✓ Identify an improper fraction that is equivalent to a mixed number less than 100.
- ✓ Multiply whole numbers.
- ✓ Show that any whole number may be written with a denominator of one.

2. Introduce.

☐ Multiplication of fractions is an extension of multiplication of whole numbers. When we say "three of those" we may mean three packages (which may each contain seven items), and this may lead us to the use of multiplication (3x7). By the same reasoning, we can compute *three-fifths* of anything using multiplication.

There are several different uses for multiplying with fractions:

finding part of a whole	3/5 x 40
finding part of a part	3/5 x 7/10
finding part of a mixed number	4/5 x 3 1/2
finding mixed number products	4 2/3 x 7 4/5

☐ Discuss rationale for learning by using examples relevant to students' experience. Solicit student input.

3. Present vocabulary concepts.

☐ Discuss vocabulary terms and give examples.

- *Property of One*
- *cross cancellation*

4. Conduct initial learning activity.

☐ Tell students when multiplying fractions to multiply *numerator* times *numerator* and *denominator* times *denominator.* Be sure that the students do not get *multiplication* of fractions confused with *adding* and *subtracting* fractions.

☐ Have the students draw ______X_______ on their papers.
Now, above the X draw an arrow pointing to the right and below X draw an arrow pointing to the right $\frac{2}{3} \overset{\rightarrow}{\underset{\rightarrow}{x}} \frac{3}{4}$

Now complete the problem and be sure that the students reduce this to $\frac{1}{2}$.

☐ This would be a good time to review putting the answer in lowest terms.

5. Present each multiplication of fractions concept with examples.

Four concepts are presented in Section 3. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the examples provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Incorrectly renaming a mixed number as an improper fraction	*Model the renaming by showing the whole numbers as the sum of its parts (e.g., 3 1/2 is the same as [1/2 + 1/2] + [1/2 + 1/2] + [1/2 + 1/2] + 1/2) which, in turn, is the same as 7/2. After several such examples most of which do not have unit fractions, teach for transfer to the "denominator x whole number + numerator" method.*
✗ Incorrectly cross cancelling	*Use a drill requiring only that students show the cross cancelling steps. The final product is not solicited, nor is it accepted in lieu of the requested steps.*
✗ Multiplying just the whole numbers, then adding the fractions, when multiplying with mixed number	*Use a mixed drill requiring only that students (a) decide if renaming as improper fractions is appropriate, and if so, (b) rewrite the problem with any such renaming.*
✗ Multiplying the whole number times just the fractional part of the mixed number	*See above suggestion.*

✘ Multiplying incorrectly	*Review basic facts as well as multiplication method, as needed.*
✘ Failing to simplify, or simplifying incorrectly	*Use several drills (perhaps hand written) which show problems with all computational markings and answers. The answers should be mixed — completely simplified, partially simplified, and not simplified at all. Ask students to check these papers to determine if all the answers have been simplified. This drill may promote the habit of checking for completion.*
✘ Finding a common denominator before multiplying	*Provide several examples in which students (a) find common denominators before multiplying, and then (b) multiply without finding common denominators first. Compare the results, pointing out equal answers. Time each method and chart the amount of time saved.*

7. Reinforce.

Selected reinforcement strategies are listed below.

- Practice modeling multiplication of fractions, using the method described in the initial learning activity.
- Have students play bingo, or other games to practice basic facts.
- Have students practice basic multiplication facts, using microcomputer drill and practice programs.
- Assign other activities to practice and reinforce, as needed.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on multiplication of fractions; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in the student section, or make an alternate form, to assess skill mastery.

Section 4: Division of Fractions

What This Section Is About...

In this section students will practice finding reciprocals, and dividing fractions, mixed numbers, and whole numbers.

Scope and Sequence of Section 4

Events	Activities
1. Determine present level.	Assign Quiz as pretest.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary.	p. 160
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Dividing two fractions	p. 156
b. Dividing a fraction and a whole number	p. 157
c. Dividing two mixed numbers	p. 158
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p.159

Suggestions for Teaching...

Suggestions are provided below for teaching division concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer Quiz as a pretest (p. 159).

Prerequisite Skills for Section 4

✓ Divide whole numbers.

✓ Multiply fractions and mixed numbers.

2. Introduce.

☐ Remind students that there are two basic ways to interpret the idea of division:
It is a short form of repeated subtraction.
It is a short form of partitioning, or "dealing."
So, the sentence 3 3/4 ÷ 3/4 = ______ may mean, "How many times can I subtract 3/4 from 3 3/4," or "How many 3/4's are there in 3 3/4?"

Remind students also that division is *not* commutative, that is, order *is* important in division—unlike addition or multiplication where it doesn't matter in which order you compute. The symbol ÷ means *divided by*. 3/4 ÷ 1/2 must be read "3/4 divided by 1/2" not "1/2 ÷ 3/4." This discussion may prevent confusion about which fraction to invert before multiplying.

☐ Discuss division as it relates to student experiences to develop rationale for learning. Solicit student input.

3. Present vocabulary concepts.

❑ Discuss vocabulary terms (p. 160) and give examples.

- *invert*
- *reciprocal*

4. Conduct initial learning activities.

❑ Give this example of a reciprocal, or multiplicative inverse, when vocabulary words are explained.

$$\frac{2}{3} \times \frac{3}{2} = \frac{6}{6} = 1$$

Note: Use the word *reciprocal* for general math students. Explain that this is the key to understanding division of fractions.

❑ Put these examples on the board for students to copy.

a) $\frac{2}{3} \div \frac{1}{2} = \frac{2}{3} \times \frac{2}{1} = \frac{4}{3} = 1\frac{1}{3}$

b) $1\frac{2}{5} \div \frac{2}{3} = \frac{7}{5} \times \frac{3}{2} = \frac{21}{10} = 2\frac{1}{10}$

c) $8\frac{3}{5} \div 5 = \frac{43}{5} \div \frac{5}{1} = \frac{43}{5} \times \frac{1}{5} = \frac{43}{25} = 1\frac{18}{25}$

d) $2\frac{1}{2} \div 1\frac{2}{5} = \frac{5}{2} \div \frac{7}{5} = \frac{5}{2} \times \frac{5}{7} = \frac{25}{14} = 1\frac{11}{14}$

☐ Solicit input from students as to observations they can make about the problems.

Note: Emphasize the importance of *not* changing the division symbol to multiplication, *until* the second fraction has been inverted.

5. Present each division of fractions concept with examples.

Three concepts are presented in Section 4. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✘ Failure to invert before multiplying	*Provide drill which only requires correctly rewriting the problem as multiplication.*
✘ Inverting dividend instead of divisor	*See comment in the Introduction about ÷ symbol, and provide appropriate drill; see above suggestion.*

Note: See also common errors for multiplication of fractions in Section 3.

7. Reinforce.

Selected reinforcement strategies are listed below.

- Have students play bingo, a *"race to the board"* game, or other game to practice basic facts.
- Have students practice basic division facts, using microcomputer drill and practice programs.
- Assign other activities to practice and reinforce, as needed.
- Use Cuisenaire Rods and other concrete objects to demonstrate fractions visibly.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on division of fractions; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in the student section, or use alternate form, to assess skill mastery.

UNIT 2: FRACTIONS

Answer Keys

Section 1: Addition

Page 85

1. $\frac{5}{8}$ 2. $\frac{1}{3}$

3. $\frac{3}{8}$ 4. $\frac{2}{5}$

Page 86

5. $\frac{4}{7}$

6. $\frac{1}{2}$

7. $\frac{1}{2}$

8. $\frac{2}{5}$

Page 87

1. $2\frac{2}{3}$ 2. $9\frac{2}{5}$ 3. $\frac{1}{3}$

4. $\frac{1}{2}$ 5. 8 6. $\frac{3}{4}$

1. $\frac{4}{7}$ 2. $\frac{3}{4}$

3. $1\frac{1}{3}$ 4. $\frac{9}{10}$

5. $3\frac{3}{4}$ 6. $12\frac{1}{2}$

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1. denominator
2. numerator
3. improper fraction
4. mixed number
5. lowest terms
6. proper fraction
7. mixed number or simplified
8. lowest term

UNIT 2: FRACTIONS

Answer Keys

Section 1: Addition

Page 91

	1.	$\frac{3}{4}$	1 2 3 6 1 2 4 6	GFC = ⑧
	2.	$\frac{2}{3}$	1 4 1 2 3 4	GFC = ②
	3.	$\frac{1}{3}$	1 3 1 3 9	GFC = ③
	4.	$\frac{3}{4}$	1 3 9 1 2 3 4 6 12	GFC = ③
	5	$\frac{1}{2}$	1 5 1 2 3 4 6 12	GFC = ⑤

Page 92

1. c
2. a
3. b
4. a
5. d

Page 93

1. $\frac{4}{5}$ 2. $\frac{1}{3}$

3. $\frac{1}{2}$ 4. $\frac{2}{3}$

5. $\frac{1}{6}$ 6. $\frac{1}{3}$

7. $\frac{2}{7}$ 8. $\frac{2}{3}$

9. $\frac{1}{2}$ 10. $\frac{5}{9}$

11. 2 12 1

Page 94

1. $\frac{4}{5}$ 2. $\frac{7}{8}$

3. $\frac{4}{7}$ 4. $\frac{9}{11}$

UNIT 2: FRACTIONS Answer Keys

Section 1: Addition

Page 94

5. $\frac{11}{15}$ 6. $\frac{11}{12}$

7. $\frac{9}{10}$ 8. $\frac{11}{13}$

9. $\frac{3}{5}$ 10. $\frac{7}{8}$

Page 95

1. $40\frac{3}{5}$ 2. $59\frac{7}{8}$ 3. $65\frac{2}{3}$

4. $81\frac{2}{5}$ 5. $61\frac{1}{3}$ 6. $114\frac{1}{4}$

7. $77\frac{4}{5}$ 8. $88\frac{1}{2}$ 9. $77\frac{3}{4}$

10. $85\frac{3}{5}$ 11. 27 12. $32\frac{2}{5}$

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1. $\frac{2}{6}$ $\frac{1}{6}$ 6. $\frac{3}{16}$ $\frac{4}{16}$

2. $\frac{4}{10}$ $\frac{1}{10}$ 7. $\frac{16}{24}$ $\frac{5}{24}$

3. $\frac{6}{14}$ $\frac{5}{14}$ 8. $\frac{16}{20}$ $\frac{9}{20}$

4. $\frac{14}{18}$ $\frac{7}{18}$ 9. $\frac{21}{27}$ $\frac{4}{27}$

5. $\frac{5}{12}$ $\frac{9}{12}$ 10. $\frac{4}{15}$ $\frac{5}{15}$

UNIT 2: FRACTIONS

Answer Keys

Section 1: Addition

Page 97

1. $\frac{6}{15}$ $\frac{10}{15}$
2. $\frac{7}{63}$ $\frac{27}{63}$
3. $\frac{5}{20}$ $\frac{8}{20}$
4. $\frac{27}{72}$ $\frac{16}{72}$
5. $\frac{35}{42}$ $\frac{24}{42}$
6. $\frac{9}{18}$ $\frac{8}{18}$
7. $\frac{16}{120}$ $\frac{15}{120}$
8. $\frac{35}{84}$ $\frac{12}{84}$
9. $\frac{30}{78}$ $\frac{65}{78}$
10. $\frac{30}{110}$ $\frac{77}{110}$

Page 98

1. $\frac{11}{12}$
2. $\frac{3}{4}$
3. $\frac{5}{6}$
4. $\frac{7}{8}$
5. $\frac{11}{12}$
6. $\frac{7}{10}$
7. $\frac{13}{20}$
8. $\frac{7}{10}$
9. $\frac{13}{40}$
10. $1\frac{7}{8}$
11. $\frac{1}{2}$
12. $\frac{17}{36}$

Page 99

1. $1\frac{1}{10}$
2. $1\frac{1}{4}$
3. $1\frac{23}{40}$
4. $\frac{9}{10}$
5. $1\frac{1}{12}$
6. $1\frac{1}{30}$
7. $1\frac{1}{6}$
8. $\frac{19}{30}$
9. $1\frac{5}{24}$
10. $1\frac{3}{20}$

Page 100

1. $29\frac{3}{4}$
2. $70\frac{11}{15}$
3. $64\frac{5}{8}$
4. $63\frac{7}{10}$
5. $73\frac{13}{24}$
6. $81\frac{7}{10}$
7. $85\frac{11}{12}$
8. $104\frac{19}{40}$
9. $82\frac{13}{20}$
10. $123\frac{1}{2}$
11. $74\frac{14}{15}$
12. $34\frac{7}{12}$

UNIT 2: FRACTIONS Answer Keys

Section 1: Addition

Page 101	1.	$3\frac{1}{2}$	2.	$2\frac{2}{3}$
	3.	$1\frac{5}{6}$	4.	$2\frac{2}{5}$
	5.	$1\frac{7}{8}$	6.	$3\frac{3}{10}$
	7.	$2\frac{21}{25}$	8.	$3\frac{3}{4}$
	9.	$3\frac{21}{50}$	10.	$3\frac{13}{20}$
Page 102	1.	$6\frac{1}{4}$	6.	$18\frac{18}{31}$
	2.	$1\frac{1}{12}$	7.	$5\frac{4}{5}$
	3.	$3\frac{4}{7}$	8.	$2\frac{1}{7}$
	4.	$2\frac{1}{9}$	9.	$13\frac{13}{20}$
	5.	$5\frac{2}{5}$	10.	$13\frac{14}{15}$
Page 103	1.	$\frac{4}{7}$	6.	$\frac{6}{7}$
	2.	$\frac{2}{3}$	7.	1
	3.	1	8.	1
	4.	1	9.	$1\frac{1}{5}$
	5.	$\frac{3}{5}$	10.	$1\frac{2}{7}$

UNIT 2: FRACTIONS Answer Keys

Section 1: Addition

Page 104	1.	$1\frac{5}{12}$	2.	1	3.	$1\frac{1}{4}$	4.	$\frac{17}{24}$
	5.	$1\frac{7}{12}$	6.	$1\frac{19}{40}$	7.	$1\frac{8}{15}$	8.	$1\frac{31}{80}$
	9.	$\frac{17}{24}$			10.	$1\frac{7}{8}$		
	11.	$1\frac{4}{15}$			12.	$\frac{19}{24}$		
Page 105	1.	63	2.	$102\frac{2}{5}$	3.	94		
	4.	$56\frac{1}{4}$	5.	$40\frac{3}{5}$	6.	62		
	7.	$131\frac{2}{3}$	8.	$113\frac{1}{2}$	9.	$118\frac{1}{5}$		
	10.	$68\frac{3}{5}$	11.	$76\frac{2}{7}$	12.	66		
Page 106	1.	$58\frac{13}{24}$	2.	$144\frac{1}{2}$	3.	$58\frac{1}{4}$		
	4.	$105\frac{23}{40}$	5.	$41\frac{5}{12}$	6.	$66\frac{3}{10}$		
	7.	$55\frac{5}{24}$	8.	$95\frac{1}{30}$	9.	$70\frac{1}{3}$		
	10.	$91\frac{1}{8}$	11.	$42\frac{7}{8}$	12.	$27\frac{5}{6}$		
Page 107	1.	$5\frac{7}{10}$ hours						
	2.	$3\frac{3}{4}$ dozen						
	3.	$30\frac{1}{6}$ hours						

UNIT 2: FRACTIONS

Section 1: Addition

4. $2\frac{3}{8}$ yards

5. $18\frac{11}{16}$ feet long

Section 2: Subtraction

Page 119
1. $\frac{1}{3}$ 2. $5\frac{13}{15}$ 3. $2\frac{3}{8}$
4. $\frac{1}{20}$ 5. $4\frac{3}{8}$ 6. $1\frac{7}{15}$
7. $21\frac{2}{3}$ 8. $8\frac{7}{12}$ 9. $\frac{9}{10}$
10. $5\frac{17}{30}$ 11. $11\frac{7}{24}$ 12. $3\frac{3}{5}$

Page 120
1. $\frac{7}{12}$
2. $\frac{2}{5}$
3. $\frac{1}{6}$
4. $\frac{1}{12}$
5. $\frac{2}{3}$
6. $\frac{3}{8}$
7. $\frac{1}{4}$
8. $\frac{3}{8}$
9. $\frac{3}{40}$
10. $\frac{1}{2}$

Page 121
1. $11\frac{1}{2}$ 2. $14\frac{2}{3}$ 3. $6\frac{2}{5}$
4. $7\frac{3}{4}$ 5. $54\frac{5}{6}$ 6. $24\frac{3}{5}$
7. $5\frac{7}{8}$ 8. $8\frac{1}{5}$ 9. $60\frac{3}{10}$
10. $27\frac{4}{5}$ 11. $30\frac{3}{4}$ 12. $7\frac{2}{3}$

UNIT 2: FRACTIONS Answer Keys

Section 2: Subtraction

Page 122	1.	$33\frac{1}{2}$	2.	$28\frac{1}{3}$	3.	$12\frac{1}{4}$
	4.	$10\frac{1}{5}$	5.	$92\frac{2}{3}$	6.	$13\frac{2}{5}$
	7.	$22\frac{9}{10}$	8.	$25\frac{5}{8}$	9.	$21\frac{1}{5}$
	10.	$66\frac{5}{6}$	11.	$56\frac{1}{5}$	12.	$10\frac{1}{4}$
Page 123	1.	$4\frac{1}{2}$	2.	$16\frac{1}{5}$	3.	$26\frac{1}{2}$
	4.	$14\frac{5}{8}$	5.	$6\frac{4}{5}$	6.	$6\frac{9}{10}$
	7.	$62\frac{1}{3}$	8.	$14\frac{5}{8}$	9.	$39\frac{1}{3}$
	10.	$55\frac{7}{10}$	11.	$10\frac{1}{2}$	12.	$29\frac{1}{6}$
Page 124	1.	$2\frac{1}{3}$	2.	$31\frac{1}{2}$	3.	$23\frac{2}{5}$
	4.	$15\frac{2}{3}$	5.	$47\frac{1}{5}$	6.	$37\frac{1}{2}$
	7.	$34\frac{1}{3}$	8.	$55\frac{1}{5}$	9.	$18\frac{5}{8}$
	10.	$90\frac{1}{4}$	11.	$75\frac{1}{5}$	12.	7
Page 125	1.	$21\frac{5}{8}$	2.	$14\frac{1}{2}$	3.	$19\frac{3}{10}$
	4.	$65\frac{1}{24}$	5.	$53\frac{1}{6}$	6.	$\frac{19}{30}$
	7.	$27\frac{3}{8}$	8.	$53\frac{7}{20}$	9.	$26\frac{7}{24}$
	10.	$48\frac{11}{30}$	11.	$8\frac{7}{15}$	12.	$32\frac{1}{6}$

Section 2: Subtraction

Page 126	1.	$23\frac{1}{2}$	2.	$54\frac{3}{5}$	3.	$\frac{1}{2}$
	4.	$20\frac{1}{2}$	5.	$\frac{2}{3}$	6.	$10\frac{1}{3}$
	7.	$15\frac{4}{5}$	8.	$14\frac{3}{4}$	9.	$33\frac{4}{5}$
	10.	$22\frac{4}{5}$	11.	$11\frac{7}{10}$	12.	$3\frac{1}{3}$
Page 127	1.	$30\frac{11}{24}$	2.	$41\frac{7}{12}$	3.	$53\frac{19}{24}$
	4.	$34\frac{7}{10}$	5.	$36\frac{3}{8}$	6.	$44\frac{13}{20}$
	7.	$16\frac{33}{40}$	8.	$\frac{4}{5}$	9.	$24\frac{23}{30}$
	10.	$\frac{11}{24}$	11.	$43\frac{7}{8}$	12.	$49\frac{14}{15}$

Page 128	1.	$14\frac{3}{8}$	in.
	2.	$6\frac{1}{2}$	lb
	3.	$9\frac{1}{4}$	hr
	4.	$974\frac{1}{2}$	lb
	5.	$4\frac{1}{8}$	in.
	6.	$2\frac{2}{5}$	degrees
	7.	$21\frac{5}{6}$	trays
	8.	$12\frac{3}{20}$	yd

UNIT 2: FRACTIONS **Answer Keys**

Section 3: Multiplication

Page 137

1. $\frac{6}{35}$
2. $\frac{21}{32}$
3. $\frac{16}{25}$
4. $\frac{7}{12}$
5. $\frac{7}{18}$
6. $2\frac{2}{3}$
7. $2\frac{1}{2}$
8. 18
9. $2\frac{7}{10}$
10. $3\frac{3}{4}$

Page 139

1. $\frac{17}{5}$
2. $\frac{25}{2}$
3. $\frac{53}{10}$
4. $\frac{207}{8}$
5. $\frac{26}{3}$
6. $\frac{63}{4}$
7. $\frac{67}{10}$
8. $\frac{127}{3}$
9. $\frac{84}{5}$
10. $\frac{35}{8}$
11. $\frac{83}{8}$
12. $\frac{72}{5}$

Page 140

1. $2\frac{1}{4}$
2. $1\frac{3}{4}$
3. $1\frac{4}{5}$
4. $9\frac{1}{2}$
5. $4\frac{2}{3}$
6. $3\frac{1}{7}$
7. 8
8. $6\frac{1}{7}$
9. $5\frac{2}{5}$
10. 9

Section 3: Multiplication

Page 141

1. $\frac{27}{8}$
2. $\frac{19}{4}$
3. $\frac{23}{9}$
4. $\frac{38}{7}$
5. $\frac{11}{5}$
6. $\frac{53}{6}$
7. $\frac{73}{10}$
8. $\frac{13}{2}$
9. $\frac{34}{5}$
10. $\frac{29}{3}$
11. $\frac{8}{5}$
12. $\frac{48}{9}$

Page 142

1. $\frac{3}{20}$
2. $\frac{5}{48}$
3. $\frac{5}{18}$
4. $\frac{8}{15}$
5. $\frac{7}{48}$
6. $\frac{15}{32}$
7. $\frac{3}{14}$
8. $\frac{7}{18}$
9. $\frac{7}{12}$
10. $\frac{5}{12}$

Page 143

1. $\frac{6}{35}$
2. $\frac{1}{8}$
3. $\frac{5}{21}$
4. $\frac{3}{5}$
5. $\frac{9}{14}$
6. $\frac{2}{9}$
7. $\frac{1}{3}$
8. $\frac{5}{12}$
9. $\frac{5}{12}$
10. $\frac{7}{48}$

UNIT 2: FRACTIONS — Answer Keys

Section 3: Multiplication

Page 144

1. $\frac{2}{15}$ — 2. $\frac{5}{28}$
3. $\frac{1}{4}$ — 4. $\frac{9}{25}$
5. $\frac{21}{32}$ — 6. 1
7. $\frac{5}{21}$ — 8. $\frac{1}{4}$
9. $\frac{1}{5}$ — 10. $\frac{3}{16}$

Page 145

1. 1 — 2. 6
3. 2 — 4. $2\frac{2}{9}$
5. $22\frac{2}{9}$ — 6. $3\frac{1}{2}$
7. 36 — 8. $2\frac{2}{35}$
9. $2\frac{11}{14}$ — 10. $1\frac{1}{2}$

Page 146

1. $\frac{3}{20}$ — 2. $\frac{1}{10}$
3. $\frac{7}{20}$ — 4. $\frac{15}{56}$
5. $\frac{5}{7}$ — 6. $\frac{8}{15}$
7. $\frac{5}{12}$ — 8. $\frac{2}{9}$
9. $\frac{1}{14}$ — 10. $\frac{1}{12}$

Section 3: Multiplication

Page 147

1. $21\frac{4}{5}$ 2. $6\frac{1}{2}$
3. $\frac{37}{6}$ 4. $\frac{317}{8}$
5. $5\frac{1}{3}$ 6. $24\frac{2}{5}$
7. $23\frac{3}{4}$ 8. 5
9. 8 10. $1\frac{1}{9}$

Page 148

1. 48 2. $12\frac{2}{3}$
3. $12\frac{1}{4}$ 4. 44
5. 30 6. $9\frac{1}{2}$
7. 72 8. 18
9. $20\frac{1}{2}$ 10. $28\frac{1}{8}$

Page 149

1. $\frac{2}{9}$ 2. $6\frac{2}{3}$
3. 25 4. $\frac{1}{4}$
5. $\frac{7}{12}$ 6. $\frac{15}{32}$
7. $8\frac{1}{6}$ 8. $4\frac{3}{8}$
9. 28 10. $45\frac{1}{3}$

Section 3: Multiplication

Page 150	1.	$56\frac{2}{9}$	2.	$80\frac{8}{9}$
	3.	$13\frac{1}{8}$	4.	$54\frac{5}{8}$
	5.	$2\frac{1}{4}$	6.	$49\frac{2}{5}$
	7.	$18\frac{3}{4}$	8.	$1\frac{13}{20}$
	9.	$35\frac{7}{15}$	10.	$1\frac{9}{16}$
Page 151	1.	$13\frac{3}{5}$	2.	39
	3.	$30\frac{2}{3}$	4.	$31\frac{5}{7}$
	5.	$33\frac{1}{3}$	6.	11
Page 152	1.	$5\frac{3}{5}$	2.	$2\frac{1}{2}$
	3.	$5\frac{1}{3}$	4.	1
	5.	12	6.	$24\frac{2}{5}$
	7.	$13\frac{1}{3}$	8.	$1\frac{2}{3}$
	9.	3	10.	$3\frac{9}{16}$

Section 3: Multiplication

Page 153

1. 92
2. $14\frac{2}{9}$
3. $56\frac{1}{27}$
4. $25\frac{5}{24}$
5. $14\frac{4}{9}$
6. $4\frac{1}{2}$
7. $111\frac{59}{72}$
8. $6\frac{26}{27}$
9. $4\frac{7}{12}$
10. $18\frac{4}{5}$

Page 154

1. $\frac{1}{4}$ of the pie
2. $\frac{1}{4}$ yards
3. 9 doughnuts
4. 24 votes
5. $5\frac{1}{4}$ cups

Section 4: Division

Page 159

1. $\frac{4}{9}$
2. $\frac{7}{16}$
3. $4\frac{3}{8}$
4. 16
5. $\frac{3}{4}$
6. $\frac{20}{21}$
7. 4
8. $2\frac{1}{3}$
9. $1\frac{47}{85}$
10. $\frac{1}{8}$

UNIT 2: FRACTIONS

Answer Keys

Section 4: Division

Page 161

1. $\frac{3}{2}$ 2. $\frac{2}{1}$ 3. $\frac{4}{3}$

4. $\frac{8}{7}$ 5. $\frac{2}{3}$ 6. $\frac{3}{11}$

7. $\frac{1}{8}$ 9. 9 9. $2\frac{2}{7}$

10. $\frac{1}{15}$ 11. $\frac{10}{1}$ 12. $\frac{2}{7}$

Page 162

1. $\frac{3}{5}$
2. $2\frac{2}{3}$
3. $5\frac{1}{4}$
4. $1\frac{1}{2}$
5. $\frac{5}{6}$
6. $3\frac{1}{3}$
7. $1\frac{1}{9}$
8. $1\frac{1}{14}$
9. $1\frac{1}{6}$
10. $\frac{25}{36}$

Page 163

1. $1\frac{1}{5}$
2. $1\frac{3}{4}$
3. $2\frac{2}{5}$
4 1
5. $\frac{5}{6}$
6. 3
7. $1\frac{5}{27}$
8. $\frac{1}{12}$
9. 1
10 2

Section 4: Division

Page 164	1.	$2\frac{2}{3}$		
	2.	$\frac{1}{4}$		
	3.	$3\frac{3}{4}$		
	4.	$7\frac{7}{8}$		
	5.	$\frac{8}{63}$		
Page 165	1.	$1\frac{1}{3}$	2.	4
	3.	8	4.	$\frac{23}{24}$
	5.	$\frac{2}{3}$	6.	$1\frac{1}{4}$
	7.	2	8.	$2\frac{3}{16}$
	9.	$\frac{5}{24}$	10.	$1\frac{1}{5}$
Page 166	1.	$7\frac{1}{2}$	2.	5
	3.	$4\frac{20}{27}$	4.	1
	5.	$1\frac{7}{128}$	6.	$2\frac{13}{36}$
	7.	$\frac{75}{88}$	8.	$1\frac{13}{32}$
	9.	$\frac{50}{99}$	10.	$4\frac{1}{2}$

UNIT 2: FRACTIONS

Page 167

1. $1\frac{1}{3}$
2. $\frac{4}{9}$
3. $\frac{5}{6}$
4. $1\frac{1}{7}$
5. $1\frac{1}{9}$
6. $1\frac{1}{3}$
7. 56
8. 16
9. $\frac{3}{20}$
10. $3\frac{1}{3}$

Page 168

1. 1
2. 1
3. $3\frac{3}{5}$
4. $1\frac{1}{2}$
5. $2\frac{2}{5}$
6. $4\frac{4}{25}$
7. $4\frac{6}{11}$
8. $\frac{2}{3}$
9. $1\frac{7}{10}$
10. $1\frac{11}{486}$

Page 169

1. $7.50
2. 9 skirts
3. $5\frac{5}{6}$ hours
4. $25\frac{1}{3}$
5. $.29 per lb for peas
6. 4 oz.
7. $8\frac{1}{2}$ hours
8. 336 mph
9. 72¢
10. $ 35, 200

UNIT 3: DECIMALS

Section 1: Addition

Section 2: Subtraction

Section 3: Multiplication

Section 4: Division

Section 5: Rounding

Overview of Unit 3

What This Unit Covers...

Unit 3 provides instruction to assist students in performing mathematical operations with decimals. The objectives and skills for this unit are listed below.

Objective 1

Compute with decimals

Skills: Add four, five-digit decimal numbers, each having no more than three decimal numbers.

Subtract five-digit decimal numbers, each having no more than three decimal places.

Multiply two decimal numbers, each having no more than two decimal places.

Divide a decimal number named in tenths or hundreths by powers of ten up to 1000.

Divide two numbers, each having no more than two decimal places, where the divisor is less than 100 with no more than two significant digits.

Round a mixed number with a whole-number component less than 100 to the nearest whole number.

Round a number less than 100 with no more than 3 decimal places to any designated number.

Objective 2

Solve real-world problems...

UNIT 3: DECIMALS

Unit 3 is comprised of 5 sections. The chart below displays the sections and concepts covered in each section for this unit.

Sections and Concepts of Unit 3

Sections	Concepts
Section 1	Adding decimal numbers
Section 2	Subtracting decimal numbers
Section 3	Multiplying decimal numbers
Section 4	Dividing decimal numbers Dividing decimal numbers by powers of ten
Section 5	Rounding decimal numbers

Unit Components...

The Teacher's Guide in each section in Unit 3 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objectives
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

Section 1: Addition of Decimal Numbers

What This Section Is About...

In this section students will practice addition of decimal numbers using a combination of decimals, mixed decimals, and whole numbers. An understanding of decimal values, the use of the decimal point, and the use of zero as a place holder will be essential.

Scope and Sequence of Section 1

Events	Activities
1. Determine present level.	Assign Quiz on p.175.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary.	p. 176
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
• Addition of decimals	p. 174
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8.. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 175

Suggestions for Teaching...

Suggestions are provided below for teaching the addition of decimals. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest (p. 175).

Prerequisite Skills for Section 1

✓ Add up to five-digit whole numbers.

✓ State place value to thousandths.

✓ Align decimal numbers vertically.

2. Introduce.

☐ In the late 1500's a mathematician named Vieta suggested using fractions having decimals which were powers of ten, but Stevir is commonly given credit for the invention of the decimal fraction. He published a book in which he explained how all fractional computation could be done as with whole numbers by using decimals. His notation was complicated, but following his work the decimal point was soon introduced, simplifying the notation.

Ask the students about where decimals are used in their "real world," and their parents'. Point out that although money issues may be the most common occurrence for use of decimals in the U.S., in other countries the metric system is in use, calling for great familiarity with decimals.

3. Present vocabulary concepts.

☐ Discuss vocabulary terms and give examples. See student vocabulary for definitions and examples.

- *decimal*
- *decimal point*
- *mixed decimal*

☐ Assign vocabulary activity on page 176.

4. Conduct initial learning activity.

☐ Select student volunteers to count the change in their pockets and call out the amounts. List the amounts on the board. *Do not* write them under each other. Use the symbol for cent whenever the amount is less than one dollar.

☐ Review procedure for placing decimal after a whole number to form a decimal number. (Example: 50 = 50. = 50.0)

☐ Question: "How can we find the total amount of change?" Use this activity to explain lining up decimals. Provide a number of examples. Have students practice lining up problem.

☐ Review the use of the dollar and cent sign.

5. Present each addition of decimal numbers concept with examples.

One concept is presented in Section 1. The Student's Guide contains concepts with examples and steps. Follow the sequence of instruction suggested below.

☐ Give rationale for learning the skill.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐. Review the use of the dollar sign and cent sign.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Addition fact error $\begin{array}{r} 2.8 \\ +\ 3.7 \\ \hline 6.3 \end{array}$	*Whole number addition review*
✗ Incorrect alignment	*Discuss the value of each digit.* *Use graph paper.*
✗ Placing decimal point in *front* of whole number to align it	*Reinforce place values of digits.* *Compare 23, 2.3, .23*

7. Reinforce.

Selected reinforcement strategies are listed below.

✻ Have students practice basic addition facts, using microcomputer drill and practice programs and timed drills.

✻ Assign other activities to practice and reinforce, as needed.

8. Summarize.

Review the major points discussed in the Introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on addition of decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Assign Quiz in student section, or use an alternate form, to assess skill mastery.

Section 2: Subtraction of Decimal Numbers

What This Section Is About...

In this section students will practice subtraction, with and without regrouping, of five-digit mixed decimal numbers, having no more than three decimal places.

Scope and Sequence of Section 2

Events	Activities
1. Determine present level.	Assign Quiz on p. 185.
2. Introduce.	See Suggestions for Teaching.
3. Review vocabulary.	p. 176
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
• Subtracting decimal numbers	p. 184
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 185

Suggestions for Teaching...

Suggestions are provided below for teaching subtraction of decimals. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest (p. 185).

Prerequisite Skills for Section 2

- ✓ State place value to thousandths.
- ✓ Subtract up to three-digit whole numbers.
- ✓ Align decimal numbers.
- ✓ Compare decimal values.

2. Introduce.

☐ When adding or subtracting with fractions, common denominators must be found. When computing with decimal numerals, however, this is not necessary, since the numerals by their very nature are already written with *common denominators*.

Regrouping, when necessary, follows the same guidelines as for whole numbers, and *empty* places may simply be filled in with zeroes to clarify this process.

3. Review vocabulary.

- ☐ No new terms are presented in this section.

4. Conduct initial learning activity.

- ☐ Review lining up decimals.

5. Present each decimal concept with examples.

One concept is presented in Section 2. The Student's Guide contains concepts with examples and steps. Follow the sequence of instruction suggested below.

- ☐ Give rationale for learning the skill. Solicit students' input when developing rationale.
- ☐ Give steps in procedure.
- ☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- ☐ Present other examples and actively involve the student.
- ☐ Assign Activity Sheets.
- ☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Incorrectly computing	*Review basic subtraction facts.*
✗ Aligning incorrectly	*Use graph paper.*
✗ Not borrowing across decimal points	*Review concept of regrouping to subtract mixed numerals(fractions). Relate mixed numerals to mixed decimals.*

✗ Placing decimal in front of whole number to align it	*Reinforce place value of digits. Compare 42., 4.2, .42.*
✗ Subtracting the larger decimal from the smaller	*Occurs with word problems. Review commutative (order) property of addition. Then compare with subtraction, showing that the principle doesn't apply.*

7. Reinforce.

Selected reinforcement strategies are listed below.

- Have students play games to practice basic facts.
- Have students practice basic subtraction facts, using microcomputer drill and practice programs.
- Assign other activities to practice and reinforce as needed.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on subtraction of decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Assign Quiz in student section, or use an alternate form, to assess skill mastery.

Section 3: Multiplication of Decimal Numbers

What This Section Is About...

In this section students will practice multiplication of decimal numbers each having no more than two decimal places. Other than finding the correct placement for the decimal point in the "answer," there is no difference between the method for multiplying whole numbers and for multiplying decimals. Students will also practice multiplying decimals by powers of ten (e.g., x 10, x 100, x 1000).

Scope and Sequence of Section 3

Events	Activities
1. Determine present level.	Assign Quiz on p.195.
2. Introduce.	See Suggestions for Teaching.
3. Review vocabulary.	p. 176
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Multiplying decimal numbers	p. 192
b. Multiplying by powers of ten	p. 194
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p.195

Suggestions for Teaching...

Suggestions are provided below for teaching the multiplication of decimals concept. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest on p. 195.

Prerequisite Skills for Section 3

- ✓ Multiply up to three-digit whole numbers.
- ✓ State place value to ten thousandths.
- ✓ Multiply a whole number and a number having no more than two decimal places.

2. Introduce.

- ☐ Discuss real-life situations where this skill is needed to establish a rationale for learning.

  In the manufacturing world, products are not priced tidily. A box of paper clips may be sold by the manufacturer to the retailer for $0.257 each, or twenty-five and seven-tenths of a cent. These same boxes may be sold in packages of six boxes. To determine the cost of a package, multiplication of decimals is used.

  Many employers require employees to use a timeclock to record their beginning and ending time for a workday. Sometimes these timeclocks are set for 100-minute hours. An employee may earn $4.75 per hour and have worked shifts totaling 36.79 hour for a given week. To determine gross salary requires multiplication of decimals.

3. Review vocabulary.

☐ No new vocabulary words are presented in this section.

4. Conduct initial learning activity.

☐ Remind students that multiplication of decimals is different than multiplication of whole numbers *only* for the correct placement of decimal in product.

☐ Stress the location of the decimal when it is not written (always on the right in a whole number.) (Example: 52 = 52. = 52.0)

☐ Review procedure for counting decimal places. Write 2.115 on the blackboard. (Question: How many decimal places are in this number?) Locate the decimal point. Count the digits to the right of the decimal point (3). Write .06 on the blackboard. (Question: How many decimal places are in this number?) 2 (Question: What is the total number of decimal places in the two numbers?) 5

☐ Give other examples like the one above to allow students opportunities to practice counting decimal places. Do Activity Sheet page196.

☐ Explain that the decimal points in multiplication do not have to be aligned as they do in addition and subtraction problems.

5. Present each multiplication concept with examples.

One concept is presented in Section 3. The Student's Guide contains concepts with examples and steps. For this concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Multiplying incorrectly	*Review of multiplication facts and of multiplication of whole numbers.*
✗ Placing the decimal point incorrectly in the answer	*Use a drill consisting of horizontal and vertical problems with answers but not decimal points. Have students correctly place decimal point.*

7. Reinforce.

Selected reinforcement strategies are listed below.

✻ Drill on basic multiplication facts.

✻ Students chart grades, scores, or number correct.

✻ Students race for completion of a problem with a correct answer.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on multiplication of decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Assign Quiz in student section, or use an alternate form, to assess skill mastery.

Section 4: Division of Decimal Numbers

What This Section Is About...

In this section students will practice division of decimal numbers with no more than two decimal places by divisors less than 100. As in the previous section, division is the same as with whole numbers, except for the need to adjust for correct placement of the decimal point in the answer. Students will also practice a shortcut for quick division by powers of ten (e.g., ÷ 10, ÷ 100, ÷ 1000).

Scope and Sequence of Section 4

Events	Activities
1. Determine present level.	Assign Quiz on p. 205.
2. Introduce.	See Suggestions for Teaching.
3. Review vocabulary.	p. 176
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Dividing decimal numbers	p. 202
b. Dividing decimal numbers by powers of ten	p. 203
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 205

Suggestions for Teaching...

Suggestions are provided below for teaching the division of decimals concept. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest on p. 205.

Prerequisite Skills for Section 4

- ✓ Divide whole numbers.
- ✓ State place value to thousandths.

2. Introduce.

Discuss situations in *real* world in which this skill is used such as comparison shopping and unit pricing. Of interest to athletes is the use of averaging times for sporting events. Students could bring in sports events programs or newspaper clippings for examples.

3. Present vocabulary concepts.

☐ Discuss vocabulary terms and give examples.

- *quotient*
- *digit*
- *repeating decimal*
- *terminating decimal*
- *non-terminating*
- *bar*

4. Conduct initial learning activity.

- ☐ Stress the location of the decimal when it is not written (always on the right) in a whole number. (*Example*: 52 = 52. = 52.0)
- ☐ Review procedure for writing division problems. (3.95 ÷ .36 = $.36\overline{)3.95}$ You must read the problem to be able to set it up correctly: 3.95 ÷ .36 is "3.95 *divided by* .36").
- ☐ Present a series of problems (one at a time) requiring division by a specific power of ten, with a variety of other numbers as dividends. Have the students find the answers any way they can, and record the answers on the board next to each problem. Repeat with another power of ten, again organizing the problems with answers on the board. Solicit input from students regarding any pattern they may see emerging. If the students do not seem to see the emerging pattern, the teacher may call attention to it by underlining the digits behind the decimal point in the divisors. Ask for a volunteer to state the pattern as a rule, or shortcut, for dividing by powers of ten. If the students do not arrive at the rule independently, the teacher may point out that the *number of places in the divisor* is the same as the *number of places the decimal point moved* from the dividend to the quotient.

5. Present each division of decimals concept with examples.

Two concepts are presented in Section 4. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- ☐ Give rationale for learning the skill. Solicit students' input when developing rationale.
- ☐ Give steps in procedure.
- ☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- ☐ Present other examples and actively involve the student.
- ☐ Assign practice Activity Sheets.
- ☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

☐ Computing incorrectly	*Review whole number division.*
☐ Misplacing the decimal	*Drill with setting up problems and placing decimal in quotient. Don't require solution or provide quotient without decimal point.*
☐ Dividing the dividend into the divisor and rounding off—particularly when the symbol (÷) is used (dividing backwards)	*Give students division problems in one form and ask them to rewrite in the other form. For example:* $3.7\overline{)42.9} \quad 42.9 \div 3.7$ and $2.8\overline{)36} \quad = \quad 36 \div 2.8$
☐ Failure to use zero as a place holder or using it incorrectly Examples: $\begin{array}{r} .005 \\ 6.4\overline{).0032} \end{array}$ $\begin{array}{r} 30. \\ 2.5\overline{)750.} \end{array}$	*Provide a set of problems which require the use of zero as a decimal placeholder (in the quotient and/or in the dividend), and ask the students to compute only to the first significant digit.*
☐ Setting up problem incorrectly Example: 54 ÷ .9 written $.54\overline{).9}$ instead of $.9\overline{).54}$	*Show the importance of order in division, as with subtraction. Provide exercise in translating back and forth between the division notations.*
☐ Failure to annex zeroes in the dividend to complete the division process.	*Stress that division is not complete until.... Instruct as to how far to divide.*

7. Reinforce.

Selected reinforcement strategies are listed below.

✱ The student may find it helpful to compare moving the decimal point in division problems with *finding equivalent fractions.* In the language of decimal numerals, one can write the following:

$.07\overline{)28}$ is the same as $\frac{28}{.07} \times \frac{100}{100} = \frac{2800}{7} = 7\overline{)2800}$

$.007\overline{).28}$ is the same as $\frac{.28}{.007} \times \frac{1000}{1000} = \frac{280}{7} = 7\overline{)280}$

$2.1\overline{).42}$ is the same as $\frac{.42}{2.1} \times \frac{10}{10} = \frac{4.2}{21.} = 21\overline{)4.2}$

$21\overline{)4.2}$ is the same as $(2.1 \times 10)\overline{)4.2 \times 10} = 21\overline{)4.2}$

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on division of decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Assign Quiz in student section, or use an alternate form, to assess skill mastery.

Section 5: Rounding of Decimal Numbers

What This Section Is About...

In this section students will round decimal numbers less than 100 with no more than 3 decimal places to any designated place.

Scope and Sequence of Section 5

Events	Activities
1. Determine present level.	Assign Quiz on p. 215.
2. Introduce.	See Suggestions for Teaching.
3. Review vocabulary.	p. 176
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples	Assign Activity Sheets.
• Rounding decimal numbers	p. 212
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 215

Suggestions for Teaching...

Suggestions are provided below for teaching rounding of decimals. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest on p. 215.

Prerequisite Skills for Section 5

- ✓ Identify decimal place values through thousandths and whole number values through tens.
- ✓ State that a decimal fraction is part of a whole.
- ✓ Round whole numbers.

2. Introduce.

☐ One of the more common applications for rounding with decimals falls into the category of unit pricing. Comparison shopping requires the buyer to figure unit prices, and the unit price will often be expressed as a decimal to several decimal places. The buyer is only interested in the price to the nearest cent, and so will round the decimal to the appropriate place.

3. Present vocabulary concepts.

Review relevant vocabulary words. No new words are presented in this section.

4. Conduct initial learning activity.

☐ Using a number line drawn on the chalkboard label with integers 1 through 10 and indicate the points .5, 1.5, 2.5, and so on. Have students locate numbers such as 1.7, or 3.2 on the line. Then ask them to find the whole number closest to each decimal. Develop the rules for rounding decimal numbers.

5. Present each rounding of decimals concept with examples.

One concept is presented in Section 5. The Student's Guide contains the concept with examples and steps. For this concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Not recognizing that rounding to the nearest whole number is the same as rounding to the ones' or units' place

Practiced by relating the decimal number to its fractional mixed number equivalent, and rounding to the nearest unit. Example:

$$37.54 = 37\frac{54}{100} = 38$$

✘ Rounding the number to the wrong place	*Review places.*
✘ Rounding up when the number should stay the same	*Use number line demonstration. Review the fact that rounding rules are conventions established for consistency around the world.*
✘ Error when attempting to round to a place that is not next-to-last place in the given numeral	*Relate rounding decimals to rounding whole numbers. For example, when rounding the whole number 3.462 to the nearest hundred, attention is focused only on the place to the right of the hundreds'—the tenths' place. All other digits (on the right) are ignored. In the same way, when rounding the decimal 3.462 to the nearest tenth, attention is focused on the place to the right, or the hundreths' place. The "2" found in the thousandths' place is disregarded, and later discarded.*
✘ Rounding only the decimal part of the digit number, neglecting the whole number part and the decimal point	*Round to a generic place using a number whose decimal point has "disappeared." Example:* $34.\underline{9}6$ *Round to underlined place; causes "4" to change also; decimal reappears.*
✘ Error when more than one digit must be changed	*Provide a drill which requires that students determine only whether or not more than one digit will be changed. (This does not refer to trailing zeroes.)*

7. **Reinforce.**

Selected reinforcement strategies are listed below.

- Extend the initial learning activity to include decimal numbers with place values in the hundreths'. "Magnify" a portion of the line between the whole numbers 29 and 30. Write numbers such as 29.83, 29.86, 29.91, and 29.97 on the chalkboard. Ask students which are closest to 29.9, and which to 29.8. (29.9; 29.8; 29.97).
- Review rounding whole numbers, and develop the generalized "rule" of *looking at the digit to the right* of the place to which you wish to round. Relate to rounding decimals.

8. **Summarize.**

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on rounding decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. **Administer posttest.**

Assign Quiz in student section, or use an alternate form, to assess skill mastery.

UNIT 3: DECIMALS

Answer Keys

Section 1: Addition

Page 175

1.	.9	2.	1.62	3.	24.3	4.	3.78
5.	4	6.	14.3	7.	10.394	8.	13.09
9.	7.7	10.	122.44	11.	1,627.58	12.	$9.89
13.	47.94	14.	626.44				
15.	$7.46						
16.	1.263						
17.	80.08						
18.	$1.55						
19.	$99.85						
20.	249.5						

Page 176

	A	B	C	D
1.		$\boxed{4.569}$	[✓ .4569]	[✓ 0.45]
2.	[✓ .354]			[✓ .068]
3.		[✓ .394]	$\boxed{3.9487}$	[✓ .0395]
4.	$\boxed{94.268}$		[✓ .94268]	$\boxed{9.4268}$

Page 177

1.	.8	2.	.09	3.	1.1	4.	1.12
5.	1.87	6.	1.58				
7.	1.193	8.	1.3				
9.	.15	10.	8.009	11.	47.79		
12.	4.6	13.	10.4563				
14.	2.06	15.	10.52				
16.	.136	17.	.3285	18.	27.79		
19.	336.42	20.	5.919				

Page 178

1.	.35	2.	1.66
3.	3.0	4.	9.813
5.	1.43	6.	$.98
7.	$101.03	8.	27.37
9.	3.3586	10.	109.08

Page 179

1.	7.9	2.	8.3
3.	22.9	4.	10.243
5.	81.57	6.	.876
7.	11.907	8.	23.83
9.	4.823	10.	28.26
11.	44.527	12.	2.122
13.	85.002	14.	65.61
15.	111.288	16.	777.94
17.	$1.00	18.	$237.90
19.	$536.95	20.	$1,000.00

UNIT 3: DECIMALS

Answer Keys

Section 1: Addition

Page 180	1.	13.7	2.	73.11
	2.	1.2	4.	3.14
	5.	10.428	6.	11.146
	7.	21.28	8.	17.653
	9.	26.24	10.	44.212
	11.	13.508	12.	16.86
	13.	16.891	14.	50.1062
	15.	5.22	16.	12.965
	17.	21.287	18.	65.074
	19.	$218.51	20.	$155.78

Page 181	1.	$179.33
	2.	45.4 gallons
	3.	8.865 meters
	4.	131.843 minutes

Section 2: Subtraction

Page 185	1.	.6	2.	.14	3.	66.53	4.	.03
	5.	1.5	6.	.1615	7.	33.856	8	3.57
	9.	$82.79	10.	2.76	11.	.165	12.	$14.50
	13.	.07	14.	.075				
	15.	3.37	16.	8.95				
	17.	$14.50	18.	.22				
	19.	.175	20.	$4.95				

Page 186	1.	.4	2.	.5	3.	.29	4.	.35
	5.	.20	6.	.621	7.	4.11	8.	12.3
	9.	1.868	10.	.02	11.	.7	12.	.0072
	13.	1.395	14.	4.093				
	15.	$84.54	16.	$38.62				
	17.	$9.91	18.	$116.38				
	19.	$1.09	20.	$ .23				

Page 187	1.	7.5	2.	3.7997
	3.	.3	4.	4.976
	5.	23.396	6.	9.88
	7.	18.008	8.	26.9933
	9.	.0947	10.	.5502

UNIT 3: DECIMALS

Section 2: Subtraction

Page 188	1.	1.869	2.	78.667
	3.	89.397	4.	2.9
	5.	23.85	6.	16.289
	7.	34.91	8.	150.81
	9.	514.3	10.	1.52
	11.	.02	12.	51.05
	13.	.006	14.	.172
Page 189	1.	4.505	2.	79.78
	3.	7.45	4.	22.36
	5.	2.04	6.	1.089
	7.	1.112	8.	1.8326
	9.	3.834	10.	1.6225
	11.	4.75	12.	3.915
	13.	5.599	14.	1.11
	15.	2.858	16.	408
	17.	122.4	18.	361.4
	19.	920.799	20.	10.02
Page 190	1.	$588.20		
	2.	$16.12		
	3.	$1958.33		
	4.	$1800.32		
	5.	$8.50		
	6.	2255.7		
	7.	$313.02		
	8.	11.8		

Section 3: Multiplication

Page 195	1.	2.4	2.	.06	3.	.348
	4.	.00441	5.	288.186	6.	.81
	7.	.006				
	8.	$2.00				
	9.	.2208				
	10.	$30.76				

Section 3: Multiplication

Page 196	1.	1	tenths
	2.	2	hundreths
	3.	2	hundreths
	4.	1	tenths
	5.	2	hundreths
	6.	2	hundreths
	7.	2	hundreths
	8.	2	hundreths
	9.	2	hundreths
	10.	1	tenths
	11.	2	hundreths
	12.	1	tenths
	13.	1	tenths
	14.	2	hundreths
	15.	2	hundreths
	16.	2	hundreths
	17.	1	tenths
	18.	1	tenths
	19.	2	hundreths
	20.	2	hundreths

Page 197	1.	.4	2.	9.6	3.	.54
	4.	2.07	5.	35.28	6.	17.64
	7.	23.79	8.	155.04	9.	3.92
	10.	3.6	11.	.18	12.	.85
	13.	2.66	14.	10	15.	2.1

Page 198	1.	831.45	2.	2550.88
	3.	234.495	4.	648.05
	5.	344.114	6.	33.9096
	7.	1483.25	8.	2634.35
	9.	2074.13	10.	511.504

Page 199	1.	25.2	2.	2208
	3.	4212.75	4.	3.55
	5.	.03	6.	.00005
	7.	.0642	8.	.279
	9.	.7512	10.	.598
	11.	$1.68	12.	$5.60
	13.	$59.50	14.	.045
	15.	$630.00	16	1.46

Page 200	1.	86	2.	12.14
	3.	30.24	4.	.204
	5.	2.88972	6.	314.43
	7.	26.0928	8.	309.73
	9.	97.8696	10.	84.318

Section 4: Division

Page 203	1.	2.3	2.	1.28				
	3.	.2	4.	2.54				
	5.	20	6.	1.12				
	7.	300	8.	8000				
	9.	5	10.	680				
Page 205	1.	32.4	2.	13.2				
	3.	107	4.	1.024				
	5.	45	6.	75				
	7.	3.5	8.	.34				
	9.	.037	10.	62.5				
Page 206	1.	38	2.	60				
	3.	70.5	4.	250				
	5.	7810	6.	.4				
	7.	90	8.	.07				
	9.	40	10.	54				
Page 207	1.	18	2.	510	3.	3.7	4.	1800
	5.	1700	6.	272.727	7.	3700	8.	240
	9.	18	10.	36	11.	1.7	12.	70
	13.	7	14.	200	15.	250	16.	140
	17.	200	18.	4.6	19.	1.2	20.	47
Page 208	1.	30.51						
	2.	.3564						
	3.	.3854						
	4.	4.9812						
	5.	41.1133						
	6.	.85						
	7.	.085						
	8.	.00246						
	9.	3.9929						
	10.	54.321						
Page 209	1.	6.211						
	2.	.0846						
	3.	6.34						
	4.	3.952						
	5.	.03564						
	6.	108.29						
	7.	.5425						
	8.	8.1029						
	9.	.00841						
	10.	.167						

UNIT 3: DECIMALS

Answer Keys

Section 4: Division

Page 210	1.	a. $1.30 b. $2.67
	2.	$323.04
	3.	197.1 gallons of gas
	4.	$4.40
	5.	5 pounds of peaches
	6.	$.36
	7.	306.5
	8.	19

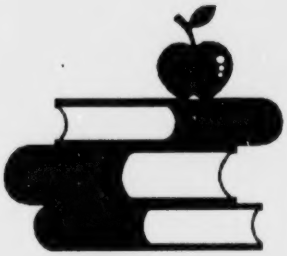
Section 5: Rounding Decimals

Page 215	1.	3.72
	2.	4.4
	3.	37
	4.	398.4
	5.	24
Page 216	1.	16.5
	2.	146.98
	3.	6.8
	4.	72.7
	5.	2.48
	6.	367.87
	7.	34.6
	8.	54.08
	9.	6.4
	10.	84.41
Page 217	1.	6.8
	2.	47
	3.	68.4
	4.	8.46
	5.	69.4
	6.	52.5
	7.	68.47
	8.	3
	9.	36.4
	10.	75

UNIT 4: PERCENT

Section 1:	Equivalent Forms
Section 2:	Percents of Whole Numbers
Section 3:	Percents of Decimal Numbers

Overview of Unit 4



What This Unit Covers...

Unit 4 provides instruction to assist students in performing mathematical operations with percent. The objectives and skills for this unit are listed below.

Objective 1

Compute with percents

Skills: Identify decimal number or percent that is equivalent to a proper fraction having a denominator of 2, 3, 4, 5, 20, 25, 50, or 1000.

Write whole-number percents as rational numbers.

Find the percentage, when given a whole number and a whole-number percent less than 100.

Find percentage when given a whole number and a whole-number percent less than 1000.

Objective 2

Solve real-world problems

Skills: Solve real-world problems involving percents using no more than two distinct operations and limited to problems concerning simple interest, sales tax, or rate of discount.

UNIT 4: PERCENT

Unit 4 is comprised of three sections. The following chart displays the sections and concepts covered in each section for this unit.

Sections and Concepts of Unit 4

Sections	Concepts
Section 1	Write a fraction as an equivalent decimal Write a decimal as a percent Write a decimal as an equivalent fraction Write a percent as a fraction
Section 2	Find a percent of a whole number
Section 3	Find a percent of two-place decimal numbers

Unit Components...

The Teacher's Guide in each section of Unit 4 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objectives
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

Section 1: Equivalent Forms

What This Section Is About...

In this section students will study the interrelationships of the fraction, decimal, and percent forms, and practice renaming from one form to another.

Scope and Sequence of Section 1

Events	Activities
1. Determine present level.	Assign Quiz on p. 225
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary.	p. 226
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Write a fraction as an equivalent decimal	p. 222
b. Write a decimal as a percent	p. 222
c. Write a decimal as an equivalent fraction	p. 223
d. Write a percent as a fraction	p. 224
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8.. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 225

Suggestions for Teaching...

Suggestions are provided below for teaching the percent concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer Quiz on p. 225 as a pretest.

Prerequisite Skills for Section 1

- ✓ Identify equivalent fractions.
- ✓ State place value through thousandths.
- ✓ Divide whole and decimal numbers.

2. Introduce.

- ☐ Percent is a convenient way to express profit and loss and is used mostly in the business world. In retail sales it is used to show mark-up and mark-down. Sales people are frequently paid on commission, which is figured as a given percent of their sales.

- ☐ Students will be learning different names for a single value. These equivalent forms are used at different times, depending on which name is most appropriate.

  Some names are more familiar than others. Three-fourths, three-quarters, 3/4, $0.75, and 75¢ is one set of equivalent forms which may be familiar to students. Some other values may become familiar quickly.

3. Present vocabulary concepts.

☐ Discuss vocabulary terms and give examples.

- *decimal*
- *decimal point*
- *is*
- *percent*
- *ratio*

4. Conduct initial learning activity.

☐ Show how to divide the bottom number into the top number to change the fraction to a decimal. Stress that division is only to two decimal places with the remainder written as a fraction. Now, move the decimal two places to the right and attach the symbol for percent (%). Tell the students that *percent* is a special ratio, in which the second number is always 100.

☐ In a question and answer session ask the students the following questions:
(a) How many boys in the room?
(b) How many girls in the room?
(c) What is the total number of students in the room?
(d) How would the number of boys be written as a fraction?
(e) How would the number of girls be written as a fraction?
(f) What percent of the total class is boys?
(g) What percent of the total class is girls?

- ❑ Present the students with the following chart of common equivalencies.

Common Equivalents

$\frac{1}{4} = 25\%$

$\frac{1}{2} = 50\%$

$\frac{3}{4} = 75\%$

$\frac{1}{5} = 20\%$

$\frac{2}{5} = 40\%$

$\frac{3}{5} = 60\%$

$\frac{4}{5} = 80\%$

$\frac{1}{3} = 33\frac{1}{3}\%$

$\frac{2}{3} = 66\frac{2}{3}\%$

- ❑ Put these examples on the board.

(a) $\frac{3}{5} = \begin{array}{r} .6 \\ 5\overline{)3.0} \\ 3\,0 \end{array} = \boxed{60\%}$ (Decimal is always on right when it is not written.)

(b) $\frac{2}{3} = \begin{array}{r} .66\ 2/3 \\ 3\overline{)2.00} \\ \underline{1\,8} \\ 20 \\ \underline{18} \\ 2 \end{array} = \boxed{66\frac{2}{3}\%}$ (Decimal always falls between the whole number and fraction when not written [e.g., 66.66].)

- ❑ When you wish to rename a mixed fraction as a decimal, compute only the fraction part.

(c) $3\frac{1}{6} = \begin{array}{r} .16\frac{4}{6} \\ 6\overline{)1.00} \end{array} = 3.16\frac{2}{3} = \boxed{316\frac{2}{3}\%}$ (Reduce fraction as necessary.)

100% means the whole of anything, or 1, so 3 is the decimal name for 300%.

5. Present each equivalent form concept with examples.

Four concepts are presented in Section 1. The Student's Guide contains concepts with examples and steps. Follow the sequence of instruction suggested below.

- ☐ Give rationale for learning the skill.
- ☐ Give steps in procedure.
- ☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- ☐ Present other examples and actively involve the student.
- ☐ Assign Activity Sheets.
- ☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Misplacing or omitting the decimal point	*Stress the importance of the decimal point by comparing two numbers whose digits are identical except for the placement of the decimal point.* *Example: 54.321 vs 543.2* *The first is a bit more than 54; the second is larger than 543. (This section may cause difficulty for students who need vision correction, or who are not wearing their prescribed glasses. Be alert to this problem.)*

✘ Dividing the denominator by the numerator

Discuss the meaning of the fraction bar in terms of division. Include examples which may tend to lead the student to an error (e.g., since most examples will not be improper fractions, mix these into the drill).

✘ Misplacing or omitting zeros

✘ Forming the decimal by placing the numerator and denominator next to each other

✘ Failing to move the decimal two places to the right.

7. Reinforce.

Selected reinforcement strategies are listed below.

❉ Teach for transfer to calculator use. The calculator user must understand how the percent key functions.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on identifying equivalent forms; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Assign Quiz provided in the student section, or use an alternate form, to assess mastery of skills.

Section 2: Percents of Whole Numbers

What This Section Is About...

In this section students will practice finding percent of whole numbers. They will learn that this is a multiplicative operation and will apply skills learned in earlier lessons.

Scope and Sequence of Section 2

Events	Activities
1. Determine present level.	Assign Quiz on p. 235.
2. Introduce.	See Suggestions for Teaching.
3. Review vocabulary.	p. 226
4. Conduct initial learning activity	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
• Finding a percent of a whole number	Page 234
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8.. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 235

Suggestions for Teaching...

Suggestions are provided below for teaching the percent concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest on p. 235.

Prerequisite Skills for Section 2

✓ Write a whole number percent as a decimal.

✓ Multiply a whole number and a number having no more than two decimal places.

2. Introduce.

☐ Buying at a discount, mark-up and mark-down, payroll commission, banking, and investments are just a few circumstances students may encounter in their future applications of finding a percent of a whole number.

☐ Provide examples of real-world situations where finding percent might be necessary.

3. Review vocabulary concepts.

☐ No new vocabulary words are presented in this section.

4. Conduct initial learning activity.

- ☐ Explain that *% of* means to ***multiply*** after writing the percent as a decimal or fraction.
- ☐ Explain that ***Is*** means ***equal to.***

5. Present the percent of whole numbers concept with examples.

One concept is presented in Section 2. The Student's Guide contains the concept with example and steps. Follow the sequence of instruction suggested below.

- ☐ Give rationale for learning the skill.
- ☐ Give steps in procedure.
- ☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- ☐ Present other examples and actively involve the student.
- ☐ Assign Activity Sheets.
- ☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Using the wrong operation (e.g. dividing instead of multiplying)	*Demonstrate the conflicting results—i.e., the multiplication answer vs. the division answer, making use of familiar percents and numbers.* *For example:* 25% *of* 100 $.25 \times 100 = 25$ $.25 \div 100 = .0025$ $100 \div .25 = 400$

✗ Misplacing the decimal point	*Use an activity in which students are given problems with the answers without decimal points. Provide practice for this specific skill.*
✗ Failing to compute correctly	*Review multiplication of decimals.*

7. Reinforce.

Selected reinforcement strategies are listed below.

- Teach for transfer with specific calculator skills.
- Provide practice for estimating percents of whole numbers. Use the context of shopping during a sale in which merchandise is not marked with the sale prices, although signs indicate the percent of reduction. Provide strategies for mentally figuring the percent of reduction.
- Teach for transfer with various wording. For example:

  Find 10% of 46.
  What is 10% of 46?
  18% of 46 is what?

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on finding percents of whole numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in the student section, or use an alternate form, to assess skill mastery.

Section 3: Percents of Decimal Numbers

What This Section Is About...

In this section students will practice finding percents of decimal numbers. They will learn this is a multiplicative operation, and will apply skills learned in earlier lessons.

Scope and Sequence of Section 3

Events	Activities
1. Determine present level.	Assign Quiz on p. 243.
2. Introduce.	See Suggestions for Teaching.
3. Review vocabulary.	p. 226
4. Conduct initial learning activity	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
• Finding percents of decimal numbers	p. 242
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8.. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 243

Suggestions for Teaching...

Suggestions are provided below for teaching the percent concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest on p. 243.

Prerequisite Skills for Section 3

- ✓ Write a whole number percent as a decimal.
- ✓ Multiply two-place decimal numbers.

2. Introduce.

- ☐ Provide examples of real-world situations where finding a percent of a decimal is used. Review introduction from previous section.

3. Review vocabulary.

- ☐ No new terms are presented in this section. Review previous words as appropriate.

4. Conduct initial learning activity.

- ☐ Explain that ***% of*** means to ***multiply*** after writing the percent as a decimal or fraction.
- ☐ Explain that ***is*** means ***equal to***.

☐ Relate to cost savings through reductions and discounts. For example, end-of-the month sales and all items marked are 40% off. The outfit you have selected is originally $57.49. How much will you save? How much will it cost? Is the ticket marked correctly? Did the cashier ring the correct amount?

5. **Present each percent of decimals concept with examples.**

One concept is presented in Section 2. The Student's Guide contains concept with example and steps. Follow the sequence of instruction suggested below.

☐ Give rationale for learning the skill.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. **Address common errors.**
Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✘ Using the wrong operation (e.g., dividing instead of multiplying)	*Demonstrate the conflicting results—i.e., the multiplication answer vs. the division answer, making use of familiar percents and numbers. For example:* $.25 \times 100 = 25$ $.25 \div 100 = .0025$ $100 \div .25 = 400$

✗ Misplacing the decimal point	*Use an activity in which students are given problems with the answers without decimal points. Provide practice for this specific skill.*
✗ Failing to compute correctly	*Review multiplication of decimals.*

7. Reinforce.

☐ Provide instruction and practice using a calculator for computing percent. Have students perform calculations without a) keying in any decimal points or b) using the percent key.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on finding percents of decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in the student section, or use an alternate form, to assess skill mastery.

Section 1: Equivalent Forms

Page 225

	Decimal	Percent
1.	.50	50%
2.	.20	20%
3.	$.66\frac{2}{3}$	$66\frac{2}{3}\%$
4.	.75	75%
5.	$.33\frac{1}{3}$	$33\frac{1}{3}\%$
6.	2.10	210%
7.	$2.66\frac{2}{3}$	$266\frac{2}{3}\%$
8.	1.25	125%
9.	.80	80%
10.	.625	$62\frac{1}{2}\%$ or 62.5

Page 227

1.	C
2.	A
3.	G
4.	D
5.	B
6.	E
7.	I
8.	F
9.	H

Page 228

1.	.5	2.	.2
3.	.4	4.	.6
5.	.8	6.	.15
7.	.35	8.	.25
9.	.14	10.	.04

Page 229

1.	$\frac{4}{10} = .4$	2.	$\frac{1}{10} = .1$
3.	$\frac{25}{100} = .5$	4.	$\frac{4}{100} = .04$
5.	$\frac{6}{10} = .6$	6.	$\frac{8}{10} = .8$
7.	$\frac{75}{100} = .75$	8.	$\frac{5}{100} = .05$
9.	$\frac{65}{100} = .65$	10.	$\frac{30}{100} = .30$

UNIT 4: PERCENTS Answer Keys

Section 1: Equivalent Forms

Page 230		Decimal	Percent
	1.	.50	50%
	2.	.25	25%
	3.	.75	75%
	4.	.89	89%
	5.	.80	80%
	6.	.40	40%
	7.	$.33\frac{1}{3}$	$33\frac{1}{3}\%$
	8.	.12	12%
	9.	.35	35%
	10.	.46	46%

		Decimal	Percent
Page 231	1.	2.25	225%
	2.	3.20	320%
	3.	.20	20%
	4.	2.75	275%
	5.	1.625	162.5%
	6.	1.75	175%
	7.	.02	2%
	8.	2.1	210%
	9.	.2	20%
	10.	6.667	666.7%

Page 232		Fraction	Decimal	Percent
	1.		.25	25%
	2.	$3\frac{3}{4}$		375%
	3.	$\frac{9}{20}$	.45	
	4.	$\frac{1}{5}$		20%
	5.		$.66\frac{2}{3}$	$66\frac{2}{3}\%$
	6.	$\frac{1}{3}$	$.33\frac{1}{3}$	

Section 1: Equivalent Forms

Page 232	Fraction	Decimal	Percent
7.	$6\frac{1}{4}$		625%
8.	$\frac{1}{4}$		25%
9.		.75	75%
10.	$\frac{3}{5}$	.60	

Section 2: Percents of Whole Numbers

Page 235	1.	8.28	2.	1.44
	3.	9	4.	234
	5.	1.45	6	14.72
	7.	105	8.	1.2
	9.	292.5	10.	12
Page 236	1.	12.48	2.	.36
	3.	.72	4.	11.2
	5.	4.2	6.	38.4
	7.	4.5	8.	19.5
	9.	368.55	10.	3
Page 237	1.	2	2.	1.88
	3.	9	4.	1.592
	5.	6.72	6.	4
	7.	5.76	8.	.45
	9.	.0378	10.	1.2
Page 238	1.	3	2.	31
	3.	26	4	69
	5.	96	6.	128.64
	7.	120	8.	82
	9.	147	10.	144

Section 2: Percents of Whole Numbers

Page 239
1. 36
2. 27
3. 17.94
4. 63 %
5. 300
6. 95%
7. 60%
8. $ .43
9. $132.60
10. $22.50
11. $840.00
12. $432.00

Section 3: Percents of Decimal Numbers

Page 243
1. 1.062
2. .675
3. 1.3975
4. .09
5. .128

Page 244
1. .184 2. .472
3. 4.29 4. .63
5. 1.394 6. .1178
7. .192 8. .05
9. .24 10. 1.652

Page 245
1. .2576 2. 2.69
3. 54.672 4. 1.434
5. 5.778 6. 2.55
7. 10.05 8. .9995
9. 1.221 10. .516

UNIT 5: GEOMETRY

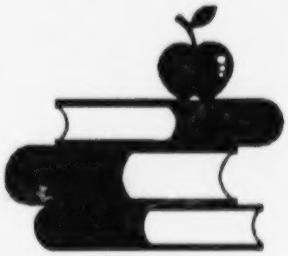
Section 1: Basic Figures

Section 2: Angles and Triangles

Section 3: Polygons

UNIT 5: GEOMETRY

Overview of Unit 5



What This Unit Covers...

Unit 5 provides instruction to assist students in performing mathematical operations with geometry. The objective and skills for this unit are listed below.

Objective 3

Understand basic geometric concepts and relations

Skills: Identify points, rays, line segments, lines, and angles.

Identify triangles by angles and sides.

Identify quadrilaterals to include squares, rectangles, parallelograms, trapezoids, and rhombi.

Identify pentagons, hexagons, and octagons.

Identify acute, obtuse, right, straight, complementary, and supplementary angles.

Identify parallel and perpendicular lines.

Identify congruent and similar polygons.

Measure angles less than 180° using a protractor.

UNIT 5: GEOMETRY

Unit 5 is comprised of 3 sections. The following chart displays the sections and concepts covered in each section for this unit.

Sections and Concepts of Unit 5

Sections	Concepts
Section 1	Identify basic geometric figures—points, rays, line segments, lines, angles, parallel lines, and perpendicular lines
Section 2	Identify types of angles—acute, obtuse, right, straight, complementary, and supplementary Measure angles using a protractor Identify triangles by angles Identify triangles by sides
Section 3	Identify various quadrilaterals—squares, rectangles, parallelograms, rhombi, trapezoids Identify pentagons, hexagons, heptagons, and octagons Identify congruent and similar polygons

Unit Components...

The Teacher's Guide in Unit 5 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

Section 1: Basic Figures

What This Section Is About...

In this section students will learn how to identify basic geometric figures called points, rays, lines, line segments, and angles. The identification of lines will include both parallel and perpendicular.

Scope and Sequence of Section 1

Events	Activities
1. Determine present level.	Assign Quiz on p. 255.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary terms.	p. 257
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concept and examples.	Assign Activity Sheets.
a. Identify points	p. 250
b. Identify lines	p. 250
c. Identify line segments	p. 251
d. Identify rays	p. 251
e. Identify angles	p. 252
f. Identify parallel lines	p. 253
g. Identify perpendicular lines	p. 253
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 255

Suggestions for Teaching...

Suggestions are provided below for teaching the geometry concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills.

Prerequisite Skills for Section 1

- ✓ Draw straight lines using a ruler.
- ✓ Read a protractor.

2. Introduce.

☐ Although geometric figures are creations of the mind, every day we see objects which suggest the ideal figures of geometry, and diagrams can be drawn which represent these geometric ideas.

☐ Provide opportunities for student to measure line segments on paper and also in real-world situations, such as measuring a room and drawing it to scale.

3. Present vocabulary concepts.

☐ Discuss vocabulary words as concepts are presented and provide examples.

- *angle*
- *dimensions*
- *horizontal*
- *line*
- *line segment*
- *intersecting*
- *parallel*
- *perpendicular*
- *point*
- *ray*
- *vertical*

☐ Assign vocabulary list for study and Vocabulary Activities on pp. 258-259.

4. Conduct initial learning activity.

☐ Demonstrate terms concretely by having students do the following on the count of three:

(a) Touch index finger to palm to represent a point.

(b) Run index finger across palm to represent a line.

(c) Place flat hand across palm to represent a plane.

(d) Place clenched fist across palm to represent space.

☐ Discuss each of the above ideas with regard to its respective dimension—i.e., a point has no dimension—it takes up no room and cannot be measured. A line has a single dimension, length, and has no width. A plane has two dimensions, length and width. Space is three dimensional—having length, width and height. The "figures" we draw are only representative of each concept.

☐ Have students identify objects in the classroom that represent points and lines. (For example: points—intersection of two walls and the floor in the corners—intersection of two walls.)

5. Present each basic figures concept with examples.

Seven concepts are presented in Section 1. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Common errors.

✘ Inability to differentiate between vertical and horizontal	*To assist students in keeping these straight suggest they associate "vertical—vertebra, horizontal—horizon."*
✘ Incorrectly defining an angle as the space between the rays	*(a) Build angles with rays made from straws. (b) Discuss the difference between the measure of an angle and the angle itself*
✘ Incorrectly naming an angle by not listing the vertex in the proper position	*Have students name angles, and demonstrate appropriate labeling. When students name an angle incorrectly, show them an angle by the given name.*

7. Reinforce.

Selected reinforcement strategies are listed below.

✻ Using compass and straight-edge (not a ruler), construct equal segments, parallel lines, and perpendicular lines.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on basic figures; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

Section 2: Angles and Triangles

What This Section Is About...

In this section students will learn to identify angles by their measure and by their relationship to another angle, and will learn to use a protractor. Students will also learn to classify triangles by angles or sides.

Scope and Sequence of Section 2

Events	Activities
1. Determine present level.	Assign Quizzes on pp. 273-274.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary terms.	p. 276
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Identify types of angles	p. 266
b. Measure angles using a protractor	p. 270
c. Identify triangles by angles	p. 272
d. Identify angles by sides	p. 272
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 273-274

Suggestions for Teaching...

Suggestions are provided below for teaching identifying the angles and triangles concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer quiz as pretest.

Prerequisite Skills for Section 2

✓ Read a protractor.

✓ Measure with a ruler.

✓ Define angle.

✓ Recognize symbol (°) for degrees.

2. Introduce.

☐ Carpentry and the craft of architecture are but two skilled professions which make use of angle and their relationships.

When a craftsman is preparing trim for a baseboard, chair railing, or crown molding, he or she must cut the wood so that the angles "fit" all corners exactly.

Solicit from the fishermen in your class the origin of the meaning of the word angler—one who fished with a hook—from the Greek meaning "barbed hook." Is a person who always fishes with a net an angler?

3. **Present vocabulary concepts.**

❑ Discuss vocabulary words and give examples. Review vocabulary words from Section 1.

- *acute angle*
- *degree*
- *complementary angle(s)*
- *equilateral triangle*
- *isosceles triangle*
- *obtuse angle*
- *protractor*
- *right angle*
- *right triangle*
- *scalene triangle*
- *straight angle*
- *supplementary angle (s)*
- *triangle*
- *vertex*
- *vertices*

❑ Assign vocabulary activity.

4. **Conduct initial learning activity.**

❑ Draw a circle on the chalkboard, showing a dot at the center. Ask the class what unit (degree) is used to measure angles, and how many "units" there are in a circle (360 degrees).

Have them estimate the size of a few angles which have three vertices at the center (center angles).

❑ Provide opportunities to practice measuring angles using a protractor. (Note: You may prefer to do a lesson covering performance standard 3.02 prior to this one.)

❑ Plan activities to illustrate the three types of angles. (Note: You may want to present the lessons covering performance standard 3.05 prior to this lesson.)

5. **Present each angle and triangle concept with examples.**

Four concepts are presented in Section 2. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

❑ Give rationale for learning the skill. Solicit students' input when developing rationale.

- ☐ Give steps in procedure.
- ☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- ☐ Present other examples and actively involve the student.
- ☐ Assign Activity Sheets.
- ☐ Provide corrective feedback.

6. Common errors.

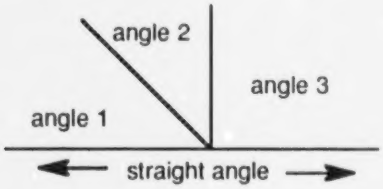
✗ Reading a protractor incorrectly	*Since most protractors have 0 to 180 running both right-to-left and left-to-right, students often choose the wrong number for measure. Practice confirming the measure by asking "Is this angle acute or obtuse?" If acute, the measure is less than 90°; if it is obtuse, the measure will be greater than 90 °.*

7. Reinforce.

Selected reinforcement strategies are listed below.

- ⁜ Provide an activity in which triangles are classified by *both* sides and angles. Include special cases, like isosceles right triangles, obtuse and acute triangles, scalene right triangles, etc.
- ⁜ Discover the sum of the measures of any triangle. Tear (don't cut!) the "corners" from several triangles drawn (and carefully cut out) by students, being careful to keep them in respective sets. Then piece together the three corners with their vertices meeting in such a way that a straight line is formed along one side.

Repeat with several sets of "corners." The result should always form a line. Since a straight angle measures 180°, the total sum of the measures of the angles must be 180°!



- ⁜ Ask students to attempt to build triangles having more than one obtuse triangle or more than one right angle. What happens?
- ⁜ Construct various kinds of angles and triangles using compass and straight edge (not a ruler).

7. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on angles and triangles; include all major concepts covered. Reinforce the importance and need for skill mastery.

8. Administer posttest.

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

Section 3: Polygons

What This Section Is About...

In this section students will learn to identify polygons with up to eight sides, and learn to identify congruent and similar polygons.

Scope and Sequence of Section 3

Events	Activities
1. Determine present level.	Assign Quiz on p. 295.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary terms.	p. 298
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Identify various quadrilaterals	p. 290
b. Identify pentagons, hexagons, heptagons, and octagons	p. 292
c. Identify congruent and similar polygons	p. 294
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 295

Suggestions for Teaching...

Suggestions are provided below for teaching geometry concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest.

Prerequisite Skills for Section 3

- ✓ Identify parts of basic geometric figures.
- ✓ Identify line segments having equal measures.
- ✓ Identify angles having equal measures.
- ✓ Measure different types of angles.

2. Introduce.

- ☐ Find polygons in common objects.
- ☐ Provide examples of polygons and have students count number of sides.
- ☐ Have students practice drawing polygons.

3. Present vocabulary concepts.

☐ Discuss vocabulary words and give examples.

- *congruent polygon*
- *heptagon*
- *hexagon*
- *octagon*
- *parallelogram*
- *pentagon*
- *trapezoid*
- *polygon*
- *quadrilateral*
- *rectangle*
- *rhombus*
- *similar polygon*
- *square*
- *plane*

☐ Assign vocabulary activity.

4. Conduct initial learning activity.

☐ Have students bring in pictures or ads and identify various polygons. Find examples of each shape in furniture, architecture, nature, art objects, etc.

5. Present each polygon concept with examples.

Five concepts are presented in Section 3. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Common errors.

✘ Inability to identify polygons not "sitting" on a horizontal base	*Provide students with opportunities to classify all figures given a variety of orientations.*

7. Reinforce.

Selected reinforcement strategies are listed below.

- Provide students with as many opportunities for practice as needed. Play "concentration" games to match shapes with their names.

- Use construction paper, rulers, and scissors and templates to draw and cut out shapes.

- Using Venn diagrams, discuss the relationships between various quadrilaterals. For example:
  - ~ a square is also a rectangle, a rhombus, and a parallelogram
  - ~ a rhombus is also a parallelogram
  - ~ a rectangle is also a parallelogram
  - ~ a trapezoid cannot be classified except as a quadrilateral, etc.

- Enhance students' intuitive understanding of the interrelationships between polygons by using various polygons and having students create tessellations, or tile patterns, in which the shapes fit against each other perfectly. This activity may be modified by limiting the students to using regular polygons. A regular polygon is one having all angles and all sides of equal measure. You may wish to solicit an art teacher's assistance.

- Using only compass and straight edge, construct squares, parallelograms, regular hexagons, etc. Regular polygons with five, seven, or nine sides provide a unique challenge in construction.

8. **Summarize.**

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on polygons; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. **Administer posttest.**

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

UNIT 5: GEOMETRY Answer Keys

Section 1: Basic Figures

Page 255
1. ray
2. point
3. angle
4. line segment
5. line

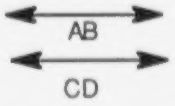
Page 256
1. perpendicular
2. parallel
3. parallel
4. perpendicular

Page 258
1. point
2. angle
3. ray
4. line
5. line segment

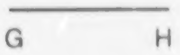
Page 259
1. parallel lines
2. protractor
3. vertical lines
4. perpendicular line
5. horizontal line

Page 260
1. XY
2. ST
3. HG, EF
4. EEFF and GGHH
5. AB
6. PQ and FG

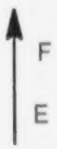
1.



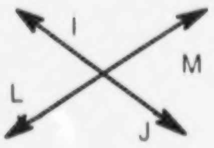
2.



3.



4.



UNIT 5: GEOMETRY

Answer Keys

Section 1: Basic Figures

Page 261

	In Words	Symbol
1.	segment FG	$\overline{FG}$
2.	line FG	$\overleftrightarrow{FG}$
3.	angle ABC	$\angle ABC$
4.	ray CA	$\overleftarrow{AC}$
5.	ray ZF	$\overrightarrow{ZF}$

Page 262

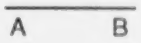
1. $\overline{ab}$, $\overline{JK}$, $\overline{EF}$

2. $\overleftrightarrow{AB}$, $\overleftrightarrow{XY}$

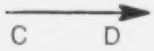
3. $\overrightarrow{CD}$, $\overrightarrow{RS}$

4. $\angle STX$ $\angle IJK$

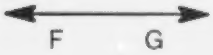
5.



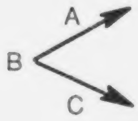
6.



7.



8.



UNIT 5: GEOMETRY — Answer Keys

Section 1: Basic Figures

Page 263
1. AD is parallel to BC
2. EG and FH are horizontal line segments
3. HJ is perpendicular to KI
4. ON and PM are vertical lines.
5. RS is a ray.

Section 2: Angles and Triangles

Page 273
1. straight
2. supplementary
3. right
4. complementary
5. acute
6. obtuse

Page 274
1. 50° 2. 20°
3. 120° 4. 45°
5. 90° 6. 130°

Page 276
1. b
2. c
3. a
4. e
5. f
6. d

Page 277
1. acute
2. right
3. straight
4. obtuse
5. supplementary
6. complementary

Page 277 bottom
1. h
2. c
3. e
4. g
5. b
6. f

Section 2: Angles and Triangles

Page 278	1.	acute				
	2.	straight				
	3.	right				
	4.	obtuse				
Page 279	1.	30°	2.	80°		
	3.	100°	4.	45°		
	5.	150°	6.	70°		
	7.	90°	8.	20°		
Page 280	a.	40°	b.	40°	c.	5°
	d.	2°	e.	13°	f.	70°
	g.	40°	h.	45°	i.	20°
Page 281	a.	150°	b.	30°		
	c.	100°	d.	90°		
	e-h	answers will vary				
Page 282	1.	a 30°	2.	b 60°		
				c 60°		
				d 60°		
	3.	EDF 90°	4.	g. 60°		
				h. 120°		
				i. 120°		
				j. 60°		
	5.	k. 50°				
Page 283	1.	60	2.	30		
	3.	130	4.	90		
	5.	90	6.	20		
Page 284	7.	75	8.	70		
	9.	110				
	10.	160				
Page 285	1.	P	2.	N		
	3.	PP	4.	N		
	5.	PP	6	P		
	7.	A	8.	O	9.	R
	10.	O	11.	O	12.	A

UNIT 5: GEOMETRY Answer Keys

Section 2: Angles and Triangles

Page 286
1. isosceles
2. equilateral
3. scalene
4. scalene
5. scalene

Page 287
1. right
2. obtuse
3. acute
4. obtuse
5. right

Section 3: Polygons

Page 295
1. square
2. rectangle
3. trapezoid
4. parallelogram
5. rhombus

Page 296
1. triangle 2. rectangle
3. pentagon 4. hexagon
5. heptagon 6. octagon

Page 297
1. S
2. S
3. N
4. C
5. N
6. S

Page 300
1. P
2. C
3. S
4. C
5. P
6. S

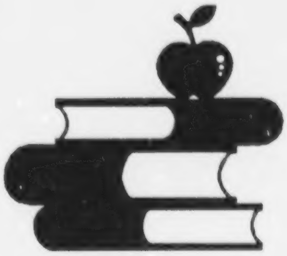
Section 3: Polygons

Page 301	1.	rectangle	
	2.	square	
	3.	trapezoid	
	4.	rhombus	
	5.	parallelogram	
	6.	quadrilateral	
	7.	polygon	
Page 302	1.	square	
	2.	parallelogram	
	3.	rectangle	
	4.	trapezoid	
	5.	parallelogram	
Page 303	1.	d	
	2.	a	
	3.	c	
	4.	b	
	5.	f	
	6.	e	
Page 304	1.	pentagon	
	2.	hexagon	
	3.	octagon	
	4.	heptagon	
Page 305	1.	Answers will vary, A, D, C, B R or P	
	2.	RA, RC, or RP	
	3.	DA or DC	
	4.	ADC	
	5.	ADCB	
Page 306	1.	A	C
	2.	C	S
	3.	E	C
	4.	B	C
	5.	F	C
Page 307	1–6	Answers will vary	

UNIT 6: MEASUREMENT

UNIT 6: MEASUREMENT

Overview of Unit 6



What This Unit Covers...

Unit 6 provides instruction to assist students in performing mathematical operations with measurement. The objectives and skills for this unit are listed below.

Objective 4

Solve problems involving measuring time, distance, capacity, and mass/weight

Skills: Determine the elapsed time between two events stated in seconds, minutes, hours, days, weeks, months, or years.

Solve a problem related to length, width, or height, given in a table of metric or customary units, up to kilometers or miles (conversion within the system).

Solve a problem involving capacity using units given in a table—milliliters, liters, teaspoons, tablespoons, cups, pints, quarts, gallons (conversion within the system).

Solve a problem involving weight/mass using units given in a table—milligrams, grams, kilograms, metric tons, ounces, pounds, tons (conversion within the system).

Objective 2

Solve real-world problems...

UNIT 6: MEASUREMENT

Unit 6 is comprised of one section. The chart below displays the concepts covered in this unit.

Concepts of Unit 6

1. **Find elapsed time**
2. **Solve problems involving units of distance/length**
3. **Solve problems involving units of capacity**
4. **Solve problems involving units of weight/mass**

Unit Components...

The Teacher's Guide in Unit 6 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objectives
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

UNIT 6: MEASUREMENT

Measurement

What This Unit Is About...

In this unit students will study four different areas of measurement: elapsed time, distance/length, capacity, and weight/mass. Both customary and metric systems are used. Problem-solving will include using tables, charts, and conversion factors to convert smaller units to larger and back within one system.

Scope and Sequence

Events	Activities
1. Determine present level.	Assign Quizzes on pp. 321, 322, 332, 341, 342, and 347.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary.	p. 323
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Find elapsed time	p. 312
b. Solve problems involving units of distance/length	p. 314
c. Solve problems involving units of capacity	p. 315
d. Solve problems involving units of weight /mass	p. 316
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8 Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 321

UNIT 6: MEASUREMENT

Suggestions for Teaching...

Suggestions are provided below for teaching measurement concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine students' present level. Administer Quizzes in student section.

Prerequisite Skills for Unit 6

✓ Perform basic operations with whole numbers.

✓ Interpret tables.

✓ Round whole numbers, fractions, and decimals.

✓ Give basic units for measuring, including abbreviations used.

2. Introduce.

☐ **Measurement.** Briefly discuss the history of measurement. Measurement in some form has been used by man since earliest times. We cannot avoid measurement in our day-to-day living. Many years ago, there were no standard units of measurement, and so people used fingers, hands, feet, and arms to measure length and distance. The width of the finger was called a *digit*, the distance across the open base of the fingers was called a *palm*, the greatest stretch of the open hand from the tip of the thumb to the tip of the little finger was called a *span*. The distance from the tip of the elbow to the end of the hand was called a *cubit*. The length across two outstretched arms from fingertip to fingertip was called a *fathom*.

Each town had its own standard of measurement which naturally varied from town to town. A yard of cloth purchased in one town would not necessarily be the same length as a yard of cloth purchased in another town. Obviously, trade between towns and countries was very difficult. Today we have the International Standard Units of Measurement located in Paris, France, and we also have the National Bureau of Standards in Washington, D.C. These standards are periodically checked against the international standards in Paris. If a manufacturer wished to make a measuring instrument, he must be certain that the product matches the official standard.

Solicit student responses to the questions that follow and perhaps allow students to later research the unanswered questions.

- Why do we need a *system* for measurement?
- What is the difference between the customary system of measurement used in our nation as compared to the metric system?
- How does converting within the systems compare? Is one system easier? Why?
- How did the customary system originate?
- How did the metric system originate?

☐ **Elapsed Time.** Discuss reasons for computing elapsed time such as confiming timecard tabulations or interpreting schedules for travel by bus, train, or air. Sports events are often reported by elapsed time (e.g., boxing, tennis).

☐ **Distance.** *Distance* is usually thought of in terms of long distances, and the term *length* is usually used to refer to shorter measures. In this unit you will find the terms used interchangeably. People frequently speak of distances using familiar references, saying things like, "it's just *three blocks* down the road," or "it's bigger than a *breadbox*."

For more detailed descriptions, a common reference is needed, hence the development of systems of measure. In the U.S., the customary system is used much more frequently than the metric system, except in scientific circles.

It is interesting to note that in our law books a yard is defined in terms of a meter; in other words, the customary system in use is described by referring to the meter.

☐ **Capacity.** In this culture most of our grocery products are packaged using customary units. Frequently a shopper may find that a package also has the metric size listed. To compare one package to another requires an ability to work with the sizes given. This is called *unit pricing.* Elicit examples of products in grocery store and in what units these are packaged. For example, soft drinks—liter, juice—gallon.

☐ **Weight/Mass.** Although some grocery items are packaged by capacity or volume, most are sold by weight. Solicit student examples (e.g., milk, juices, liquids). Shoppers may have noticed on a box of crackers a statement such as:

> *"This package is sold by weight, not by volume. Packed as full as practicable by modern automatic equipment, it contains full net weight indicated. If it does not appear full when opened, it is because contents may have settled during shipping."*

As with capacity, an ability to compare packages requires familiarity with unit pricing. Ability to convert units is necessary.

3. Present vocabulary concepts.

☐ Discuss vocabulary words and give examples. See the student section for definitions and examples.

- *capacity*
- *conversion factor*
- *distance*
- *elapsed time*
- *estimate*
- *length*
- *linear*
- *mass*
- *meter*
- *military time*
- *weight*

☐ Charts with equivalencies and abbreviations are included in the student section.

☐ Assign Vocabulary Activity.

4. Conduct initial learning activity.

- ☐ Hand out equivalency charts and tables and review conversion. Stress that conversions will only be *within* a given system. In the metric system, the conversion factors are directly related to the prefixes. Show how the same prefixes are used for all kinds of metric measurement—distance/length, capacity, and weight/mass.

- ☐ Review with students the conversion of unlike units.

- ☐ **Measurement.** Elicit from students the type of measurement used with various units. For example, given a certain unit, students will name the kind of measurement (e.g., cup—capacity; foot—length; mile—distance; pound—weight). Give both customary and metric examples.

- ☐ **Time.** Have students list as many units of time as they can. They should be able to name additional units not on the list provided, such as decade, score, century or millinnium. Point out that the units of time are the same for both the metric and customary systems.

  Discuss and review conversion, having provided students with the appropriate chart. Review also the corresponding abbreviations for the units.

  Tell students that computing to find elapsed time is very similar to subtracting mixed numbers. The regrouping process is only partly the same as for regular subtraction of whole numbers.

  Practice reading military time orally.

- ☐ **Distance/Length**. Have two students measure the classroom. Give one an unmarked stick about one yard long to measure the length of the room. Let the second student measure the width of the room with an unmarked stick about one foot long. (The sticks do not have to be a standard length.) Compare their measurements. Ask, *"Which is greater, the room's length or its width?"* Accept answers such as, *"7 and 1/2 bigsticks"* or *"15 and 1/2 shortsticks."* Then ask, *"How many sticks larger is one dimension than the other?"* The students should recognize the need to convert to one length before comparing.

☐ **Capacity.** Provide items which hold an ounce, one cup, a quart, gallon, five milliliters, a liter, etc. Provide also familiar objects, without the capacity marked, like a coffee cup, soft drink cup, mayonnaise jar, and bottles of varying sizes, etc. Allow students time to practice *guesstimating* capacities in both metric and customary units.

☐ **Weight/Mass.** Provide items which weigh an ounce, ten pounds, one milligram, a gram, five grams, a kilogram, etc. Provide also familiar objects (which do not have the weight marked), like a brick, or cinderblock, a package of hamburger, chalk, chalkboard eraser, textbooks of varying sizes. Allow students time to practice *guesstimating* weights in both metric units and customary units.

5. Present each measurement concept with examples.

Four concepts are presented in Unit 6. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Choosing the wrong operation when making conversions	*Present drills in which students select only the operation to be used when making a conversion.*
Example: Convert 4 yd to in. 36 ÷ 4 instead of 4 **x** 36	
✗ Choosing an inappropriate conversion factor	*Present drills in which students select only the conversion factor.*
Example: Convert 5 da to hr 5 x **60** instead of 5 x **24**	

7. Reinforce.

Selected reinforcement strategies are listed below.

- Practice estimation by asking students to name something that is about a foot (yd, cm, etc.) long. Name something that weighs about a lb (oz, kg, gm, etc.). Set out various containers (paper cup, jar, coffee mug, box, etc.). Have students *guesstimate* their capacity in customary and metric units.
- Practice reading bus/train/airline schedules, and determining elapsed time between departures and arrivals.
- Provide calculator drills appropriate to each lesson.
- Provide worksheets having mixed operations, all relating to time (or distance, or capacity, or weight).
- Provide drill which gives practice selecting the conversion factor needed.
- Provide drill which gives practice selecting the operation needed to make a conversion.
- Provide review for multiplication and division by powers of ten, as applied to metric conversion.

8. **Summarize.**

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on measurement; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. **Administer posttest.**

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

Time

Page 321	1.	48 months	2.	30 months
	3.	104 weeks	4.	113 weeks
	5.	1,461 days	6.	565 days
	7.	42 days	8.	120 hours
	9.	224 hrs	10.	3 years
	11.	2 years	12.	1 year 7 month
	13.	7 days	14.	14 days
	15.	4 weeks	16.	23 weeks
	17.	15 days	18.	2,016 hours
	19.	1,826 or 1827 days		20.2 years

Page 322

1. 2 hr 55 min
2. 7 hr 20 min
3. 12 hr 30 min
4. 3 da 9 hr 20 min
5. 11 hr
6. 3 da 1 hr
7. 3 hr 45 min
8. 12 hr 45 min
9. 1 da 3 hr
10. 10 hr 40 min

Page 324

1. meter
2. capacity
3. length
4. time
5. distance
6. weight
7. gram
8. liter
9. mass

Page 327	A.	1.	36	B.	1.	104
		2.	52		2.	172
		3.	115		3.	182
		4.	24		4.	93
		5.	69		5.	216

C.	1.	56	2.	2,190
	3.	550	4.	215

D.	1.	52	2.	6,048
	3.	11, 640	4.	720

E.

1. 1 1/4 yr
2. 2 2/3 yr
3. 6 2/3 yr

Time

Page 328 A. 1. 300
2. 90
3. 848
4. 1260
5. 1080

B. 1. 420
2. 320
3. 1440
4. 3120
5. 2706

C. 1. 2 wk 1 da
2. 1 wk 4 da
3. 5 wk 3 da
4. 8 wk 6 da
5. 12 wk 6 da

Page 329 A. 1. 8
2. 2
3. 1 hr 24 min
4. 15 hr 42 min
5. $\frac{1}{2}$ hr

B. 1. 9
2. 13
3. 1 min 12 sec
4. 1170
5. 135

C. 1. 53 wk 4 da
2. 4 wk 1 da
3. 2 wk 1 da
4. 1 wk 4 da
5. 5 wk 3 da

Page 330 1. 1825 da
2. 2 yr
3. 104 wk
4. 23 wk
5. 224 hr
6. 1170 min
7. 2707 sec
8. 550 da
9. 720 hr
10. 42 mo

Page 331 1. 5 hr 15 min
2. 9 hr 34 min
3. 4 hr 15 min
4. 5 hr 51 min
5. 5 hr
6. 6 hr 15 min
7. 4 hr 30 min

Time

Page 331 cont.	8.	4 hr		25 min
	9.	2 da	4 hr	15 min
	10.	5 da	5 da	15 min
	11.	2 yr		10 mo
	12.	18 yr	0 mo	6 da

Distance

Page 332	1.	108
	2.	828
	3.	211,200
	4.	38
	5.	4 yds 1 ft
	6.	5 yds 2 ft 3 in.
	7.	15,840
	8.	48
	9.	36,960
	10.	4
	11.	9
	12.	$\frac{1}{3}$
	13.	4
	14.	.01
	15.	60

Page 334	1.	12
	2.	12
	3.	3
	4.	3
	5.	36
	6.	36
	7.	5280
	8.	5280
	9.	1760
	10.	1760

Page 335	**A.**	1.	96
		2.	42
		3.	600
	B.	4.	18
		5.	14
	C.	6.	324
		7.	270
	D.	8.	3
		9.	.625
		10.	5

UNIT 6: MEASUREMENT Answer Keys

Distance

Page 336

A.
1. 22 in.
2. 71 in.
3. 259 in.

B.
4. 10 ft
5. 17 ft
6. $106\frac{1}{2}$ ft

C.
7. 60 in.
8. 83 in.
9. 18 in.

D.
10. 12,320 yd
11. 7,920 yd
12. 35,200 yd

E.
13. $3\frac{1}{3}$ mi
14. $12\frac{1}{4}$ mi
15. .0852 mi

Page 337

1. 4
2. 64
3. 84
4. 81
5. 2
6. $2\frac{1}{4}$
7. 55
8. 81
9. 221
10. 9
11. 14
12. 19
13. 53,800
14. 75
15. .625 or $\frac{5}{8}$

Page 338

1. 10
2. 100
3. 10
4. 10
5. 10
6. 10
7. 10
8. 1
9. 6
10. 20

UNIT 6: MEASUREMENT
Answer Keys

Distance

Page 339
1. 4
2. 7
3. 1760.3
4. 30
5. 2
6. 21
7. 210
8. 11
9. 111
10. 210

Page 340
1. 5
2. 74
3. 60
4. 205
5. 9
6. 40
7. 4000
8. 2.5 gal.
9. 45.5
10. 6.5

Capacity

Page 341
1. 4
2. 2
3. 12
4. 2
5. 1
6. 2
7. 2
8. 2
9. $\frac{1}{2}$
10. 10

UNIT 6: MEASUREMENT

Answer Keys

Capacity

Page 342

1. 1
2. 10
3. 10
4. 1000
5. 100
6. $\frac{1}{1000}$
7. $\frac{1}{10}$
8. 10
9. 10
10. 10

Page 344

A.
1. 112
2. 40
3. 88

B.
4. 6
5. 11
6. 50

C.
7. 160
8. 100
9. 832

D.
10. 3
11. $2\frac{1}{4}$
12. $\frac{3}{8}$

E.
13. $2\frac{1}{2}$
14. $\frac{5}{8}$
15. $\frac{1}{2}$

F.
19. 3000
20. 500

G.
16. 3
17. 7
18. $16\frac{1}{2}$

Page 345

1. 3
2. $3\frac{3}{4}$
3. 23
4. 7
5. 14
6. $6\frac{1}{2}$
7. 9
8. $11\frac{1}{2}$
9. 2
10. 16

UNIT 6: MEASUREMENT

Answer Keys

Capacity

Page 346

1. 112 oz or $3\frac{1}{2}$ qt
2. 11 pt or 1 gal. 1 qt 1 pt
3. 160 oz or 10 pt
4. $2\frac{1}{4}$ pt or 36 oz
5. 32 qt or 64 pt
6. 5 pt or $2\frac{1}{2}$ qt
7. 7 gal. or 28 qt
8. 19 pt or $2\frac{3}{8}$ gal.
9. 2 metric c
10. 20 metric c
11. 3 gal.
12. 1000 mL

Weight/Mass

Page 347

1. 16 oz
2. 2000 lb
3. 2 lb
4. 8 oz
5. $\frac{1}{4}$ lb
6. $\frac{1}{2}$ T
7. 1000 mg
8. 1000 mg
9. 1 hg
10. 1 hg
11. 19 oz
12. 5000 lb
13. 1 hg
14. .110 kg
15. 1 g

Page 349

1. 64 oz
2. 12,000 lb
3. 20,000 lb
4. 3 lb
5. 2,000 mg
6. 2 kg

UNIT 6: MEASUREMENT Answer Keys

Weight/Mass

Page 349	7.	5,000
	8.	176
	9.	4
	10.	6,000

Page 350	1.	48 oz
	2.	4 oz
	3.	14,000 lb
	4.	12,000 lb
	5.	2 lb
	6.	1 lb 5 oz
	7.	2 T
	8.	4 T
	9.	19 oz
	10.	$\frac{1}{2}$ lb

Volume

Page 351	1.	W	2.	C
	3.	L	4.	L
	5.	L	6.	W
	7.	C	8.	L
	9.	W	10.	C
	11.	L	12.	C
	13.	W	14.	L
	15.	L	16.	L
	17.	W	18.	C
	19.	W	20.	C

Denominate Numbers

Page 352	A.	1.	23 hr	2.	6 da 23 hr	3.	5 yr 11 mo
	B.	1.	13 ft 11 in.	2.	6 mi 5 ft	3.	4 yd 1 ft 7 in.
	C.	1.	8 gal. 3 qt	2.	4 c 3 oz	3.	14 gal. 1 qt 1 pt
	D.	1.	12 lb 3 oz	2.	12 lb 2 oz	3.	11 lb 11 oz

UNIT 6: MEASUREMENT   Answer Keys

Denominate Numbers

Page 353	A.	1.	9 yr 9 mo	2.	1 mo 3 wk	3.	7 hr 2 min
	B.	1.	4 ft 3 in.	2.	3 yd 1 ft	3.	4 mi 5100 ft
	C.	1.	3 qt	2.	10 oz	3.	3 gal. 2 qt
	D.	1.	5 lb 7 oz	2.	7 T 200 lb	3.	3 lb 9 oz

Page 354

A.
1. 33 min 36 sec
2. 15 yr 9 mo
3. 1 da 2 hr 40 min

B.
1. 6 yd 2 ft 8 in.
2. 37 mi 940 yd
3. 11 yd 1 ft

C.
1. 18 gal.
2. 2 qt 1 pt 7 oz
3. 3 gal. 1 pt

D.
1. 20 T 500 lb
2. 50 lb
3. 18 lb 12 oz

Page 355

a. 4
b. 9
c. 6
d. 5
e. 7
f. 1
g. 3
h. 8
i. 2
j. 10

UNIT 6: MEASUREMENT

Answer Keys

Word Problems

Page 356
1. 8 fl oz
2. more
3. 6 lb 8 oz
4. Tom's; 2 oz
5. yes; 1 lb box
6. 5 in.
7. 102 boards
8. 7 1/2 yd
9. 180 km

Page 357
10. 2.58 m
11. 10 oz
12. 2 da 10 hr 35 min
13. 11:03 a.m.
14. 11 hr 50 min
15. 3 bags
16. 120 quart bottles
17. .00142 kg
18. 37 1/2 hours
19. 4 hr 40 min

UNIT 7: PERIMETER/AREA

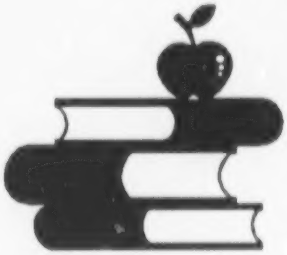
Section 1: Perimeter

Section 2: Area

UNIT 7: PERIMETER/AREA

Overview of Unit 7

What This Unit Covers...



Unit 7 provides instruction to assist students in performing mathematical operations with perimeter and area. The objectives and skills for this unit are listed below.

Objective 5

Solve problems involving area and perimeter

Skills:
- Find the perimeter of a polygon with no more than 8 sides.
- Find the circumference of a circle (let $\pi = 3.14$) when given the formula.
- Find the area of a rectangle or square.
- Find the area of a triangle, parallelogram or trapezoid, when given the formula.
- Find the area of a circle, when given the formula (let $\pi = 3.14$).

UNIT 7: PERIMETER/AREA

Unit 7 is comprised of two sections. The chart below displays the concepts covered in this unit.

Sections and Concepts of Unit 7

Sections	Concepts
Section 1	Find the perimeter of a polygon Find the circumference of a circle
Section 2	Find the area of a rectangle Find the area of a square Find the area of a triangle Find the area of a parallelogram Find the area of a trapezoid Find the area of a circle

Unit Components...

The Teacher's Guide in each section of Unit 7 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

Section 1: Perimeter

What This Section Is About...

In this section students will practice finding perimeter of polygons and circumference of circles.

Scope and Sequence of Section 1

Events	Activities
1. Determine present level.	Assign Quizzes on pp. 365-366.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary terms.	p. 367-370
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Find the perimeter of a polygon	p. 362
b. Find the circumference of a circle	p. 364
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	pp. 365-366

Suggestions for Teaching...

Suggestions are provided below for teaching perimeter concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer quiz as a pretest.

Prerequisite Skills for Section 1

- ✓ Multiply whole numbers, fractions, and decimals.
- ✓ Add whole numbers, fractions, and decimals.
- ✓ Locate base and height of a triangle.
- ✓ Convert linear units of measurement.
- ✓ Identify circles, triangles, parallelograms, and other polygons up to eight sides.

2. Introduce.

☐ Perimeter is often an unfamiliar word to students. Students may have heard of guards (or guard dogs) "patrolling the *perimeter* of the grounds." This means the guard is walking along the border, all the way around the edge of a particular property.

Perimeter is the *distance around* an object. It can be found by adding the lengths of all the sides. For special figures like rectangles, finding perimeter always follows a pattern and can be computed using a formula.

There are basically three different circumstances under which perimeter will be computed—regular or semi-regular polygons, polygons with no special features, and circles.

The perimeter of a circle has a name all its own—circumference. Mathematicians have found that the circumference of a circle is a little more than three times the diameter of the circle. Circumference can be calculated using diameter and pi(π).

3. Present vocabulary concepts.

☐ Discuss vocabulary words and give examples.

- *circle*
- *circumference*
- *diameter*
- *formula*
- *parallelogram*
- *perimeter*
- *pi (π)*
- *polygon*
- *quadrilateral*
- *radius*
- *rectangle*
- *regular polygon*
- *square*
- *trapezoid*

☐ Assign vocabulary activity.

4. Conduct initial learning activities.

☐ To introduce perimeter of any polygon, present students with a variety of polygons. Mix the examples to provide different numbers of sides and special shapes, as well. Each side of each polygon should be labeled with a length—even the squares and other special polygons.

Ask the students to find the perimeter for each figure. Discuss and clarify that for *any* polygon, perimeter can be found by adding the lengths of all sides.

☐ Discuss perimeter of a rectangle or square. Describe the attributes of each figure shown as it pertains to finding perimeter. Ask: Why is finding the perimeter of a *regular* figure easier than finding the perimeter of an *irregular* figure? Why can finding the perimeter of a rectangle be easier than finding the perimeter of an irregular quadrilateral?

☐ Obviously, a circle is not a polygon. It has no *sides*. Therefore, a different method is needed to calculate its perimeter, more specifically called *circumference.*

Using a compass, draw a circle after marking a spot for its center. With the compass open to the same radius, construct a hexagon by marking off six equal arcs. Then connect these marked points on the circle to form a regular hexagon. (If you wish, you could further divide the circle by marking half-way between each point.) Then cut the circle into the sectors so determined. If you arrange the sectors approximately in the shape of a parallelogram, the perimeters will appear the same.

☐ Use tagboard cutouts of polygons and circles. Use string to measure perimeters and circumference.

☐ Discuss formulas, derivations, abbreviations. Note similarities between formulas, especially $C = \pi d$ and $C = \pi r^2$.

5. **Present each perimeter concept with examples.**

Two concepts are presented in Section 1. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Give rationale for learning the skill. Solicit students input when developing rational.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided In the Student's Guide.

☐ Present other examples and actively involve the student.

- ☐ Assign Activity Sheets.
- ☐ Provide corrective feedback.

6. Address Common Errors

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ inability to differentiate between the use of *r* (radius) and *d* (diameter)	*To develop an understanding of the relationship between radius and diameter, present several examples of circles with diameters identified, and lead students to determine the radii of those circles; repeat using circles with given radii, determining diameters.*

7. Reinforce.

Selected reinforcement strategies are listed below.

- ⁜ Make Bingo type games with pictures of geometric figures. Call out names of figures and have student cover shapes.
- ⁜ Find circular objects such as a record, wheel, spool, and can. Have students measure diameter and circumference.
- ⁜ Use geoboard or graph paper to draw quadrilaterals and calculate area by counting square units.
- ⁜ Lead student to discover the more specific formulas for finding perimeter of rectangles ($2l + 2w$) and squares ($4s$).
- ⁜ Provide numerous examples of rectangles which have sides whose measures are larger numbers (for example: sides measuring 43, 57, 43, 57, or 125, 36, 125, 36). Challenge them to hunt for a faster method to compute perimeter. When several students seem to have discovered a quicker method, ask them to share their procedure with the class. Develop the generalization $2l + 2w$.

- In the same way challenge them to use multiplication to compute the perimeter of squares by providing examples having sides whose measures would be less tedious to multiply than add (327 or 59), using 4*s* for their new formula.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on perimeter; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

Section 2: Area

What This Section Is About...

In this section students will practice finding the area of rectangles, squares, triangles, parallelograms, trapezoids, and circles.

Scope and Sequence of Section 2

Events	Activities
1. Determine present level.	Assign Quizzes on pp. 383-384.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary terms.	p. 385-386
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Find the area of a rectangle	p. 376
b. Find the area of a square	p. 377
c. Find the area of a triangle	p. 378
d. Find the area of a parallelogram	p. 379
e. Find the area of a trapezoid	p. 380
f. Find the area of a circle	p. 381
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	pp. 383-384

Suggestions for Teaching...

Suggestions are provided below for teaching area concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer Quizzes on pp. 383 and 384 as a pretest.

Prerequisite Skills for Section 2

- ✓ Multiply whole numbers, fractions, and decimals.
- ✓ Locate base and height of a triangle.
- ✓ Convert linear units of measurement.
- ✓ Identify circles, triangles, parallelogram, and other polygons up to eight sides.

2. Introduce.

- ☐ In the first section of this unit students studied how to find perimeter. Perimeter is a linear measure; a measure of dimension. Area, however, is a two-dimensional measure, and finding areas results in a measure in terms of a square unit. Area describes the surface covered.

3. Present vocabulary concepts.

- ☐ Discuss vocabulary words and give examples. Review vocabulary words from Section 1.

  - *altitude*
  - *area*
  - *base*
  - *height*

- ☐ Assign vocabulary activity.

4. Conduct initial learning activities.

- ☐ Provide numerous unlabeled examples of rectangles on a handout. Review the meaning of area, and discuss the difference between measuring with linear and square units.

  Demonstrate how a rectangle with sides measuring 3 units and 5 units can be marked off into 15 square units. Repeat with other examples, having greater and greater lengths of sides, until a student volunteers the concepts behind the formula, and them provide the formula in its generalized form (A = bh).

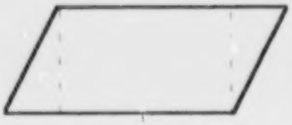
- ☐ Develop the formulas for finding areas of triangles, parallelograms, and trapezoids using the formula for rectangles.

  Draw a rectangle on the chalkboard and *divide* it by drawing in one diagonal. Point out that two triangles can now be seen. Repeat with tagboard cut into the shape of a rectangle. Ask students to predict the area of either of the triangles which will be created by cutting along the diagonal; then, make the cut.

  Show the students that the triangles have the same area by laying one on top of the other. Repeat with other tagboard rectangles. Ask the students how they could compute the area of each triangle if they knew the area of the original rectangles. Practice using the handout previously prepared.

  After students have successfully computed the area of the triangles, provide them with generalized form [A = (bh)/2].

- ☐ For a parallelogram use the same procedure, only this time, cut off the *end-piece* triangles formed by drawing in the altitudes. Create a rectangle by rearranging the three pieces.



- ☐ Repeat for parallelograms and trapezoids.
- ☐ For circles, follow the same activity as for finding perimeter, with necessary substitutions for area.

5. Present each area concept with examples.

Six concepts are presented in Section 2. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- ☐ Give rationale for learning the skill. Solicit students input when developing rational.
- ☐ Give steps in procedure.
- ☐ Model the strategy with an example. Refer students to the example provided In the Student's Guide.
- ☐ Present other examples and actively involve the student.
- ☐ Assign Activity Sheets.
- ☐ Provide corrective feedback.

6. Address Common Errors

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✘ Choosing a non-vertical side to represent the height of a triangle	*Discuss the specific meaning of height, and demonstrate the difference in area of two triangles, one having...*
✘ Choosing the incorrect formula for area of a circle	*Discuss the result obtained for each formula ($2\pi r$ or πr^2) in terms of dimension. $2\pi r$ yields a linear unit; πr^2 yields a square unit.*
✘ Choosing incorrect formula (perimeter vs. area)	*With all formulas listed on one side of the chalk board, drill orally. Sketch figures with all measures labeled; ask students to write the correct formula with substitutions for area or perimeter.*

7. Reinforce.

Selected reinforcement strategies are listed below.

- To provide mixed practice, provide a activity sheet containing circles, triangles, rectangles, parallelograms, trapezoids, and squares. Have students find both area and perimeter for each figure.
- Provide practice with students constructing the altitude for triangles, parallelograms, and trapezoids.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on area; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

UNIT 7: PERIMETER/AREA Answer Keys

Section 1: Perimeter

Page 365	1.	26 in.	2.	24 ft		
	3.	26 yd	4.	15 ft		
	5.	18 yd	6.	24 in.		
Page 366	1.	175.84	2.	307.72		
	3.	25.12	4.	18.84		
	5.	43.96	6.	94.2		
Page 368	1.	square	2.	rectangle		
	3.	trapezoid	4.	circle		
Page 369	5.	radius	6.	polygon		
	7.	parallelogram	8.	polygon		
	9.	parallelogram	10.	diameter		
Page 371	1.	$22\frac{1}{2}$	2.	36	3.	30
	4.	$33\frac{1}{3}$	5.	10	6.	42
	7.	$27\frac{1}{2}$	8.	41.6	9.	30
Page 372	1.	32	2.	28	3.	21
	4.	12	5.	20	6.	22
	7.	20	8.	24	9.	18
Page 373	1.	$16\frac{1}{4}$	2.	12	3.	30
	4.	30	5.	20.8		
	6.	29				
	7.	70 ft				
	8.	150				
Page 374	1.	65.94	2.	43.96	3.	31.40
	4.	16.485	5.	31.40	6.	21.98
	7.	50.24	8.	12.56	9.	32.97

Section 2: Area

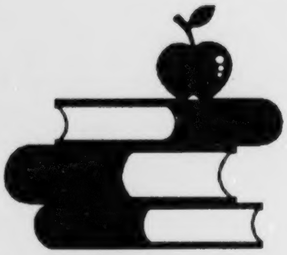
Page 383	1.	91	2.	$72\frac{1}{4}$
	3.	12	4.	144
	5.	95	6.	113
Page 384	7.	18	8.	$22\frac{1}{2}$
	9.	16.5	10.	84
Page 387	1.	236	2.	46
	3.	42	4.	49.5
	5.	78.5	6.	16.6
Page 388	1.	$52\frac{1}{2}$	2.	106
	3.	30	4.	230
	5.	9.6	6.	153.9
Page 389	1.	144	2.	21
	3.	30	4.	230
	5.	39.6	6.	153.9
	7.	17.25	8.	16
Page 390	1.	56	2.	259
	3.	10	4.	158
	5.	72	6.	.79

UNIT 8: GRAPHS

UNIT 8: GRAPHS

Overview of Unit 8

What This Unit Covers...



Unit 8 provides instruction to assist students in performing mathematical operations with graphs. The objective and skills for this unit are listed below.

Objective 6

Demonstrate knowledge of line, bar, and circle graphs

Skills: Determine relationships described by line graphs, bar graphs, circle graphs, or tables.

Organize data into a line graph, bar graph, or table.

UNIT 8: GRAPHS

Unit 8 is comprised of one section. The chart below displays the section and concepts covered in this unit.

Concepts of Unit 8

1. **Interpret line, bar, and circle graphs**
2. **Construct line, bar, and circle graphs**

Unit Components...

The Teacher's Guide in Unit 8 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

UNIT 8: GRAPHS

Graphs

What This Unit Is About...

In this unit students will study how circle, line, and bar graphs are used to provide information in concise forms. They will learn how to interpret and create circle, line, and bar graphs.

Scope and Sequence

Events	Activities
1. Determine present level.	Assign Quizzes on pp. 401-403.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary.	p. 404
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Interpret graphs	p. 394
b. Construct graphs	p. 397
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8 Summarize.	See Suggestions for Teaching.
9. Administer posttest.	pp. 401-403

UNIT 8: GRAPHS

Suggestions for Teaching...

Suggestions are provided below for teaching graph concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer quiz as pretest.

Prerequisite Skills for Unit 8

- ✓ Use a protractor.
- ✓ Draw a circle.
- ✓ Identify fractional parts and percentages.
- ✓ Compute with whole numbers, fractions, and decimals.

2. Introduce.

- ☐ Beginning in this unit on graphs, descriptive statistics will be introduced. In Unit 9 students will study measures of central tendency, another area of descriptive statistics.

  Sometimes it is sufficient to display data in the form of a table. Other times the data is easier to interpret when presented in the form of a graph. *Bar* graphs help give a visual comparison of the size of various items. *Line* graphs show data that continually changes. *Circle* graphs help make comparisons between parts and the whole unit.

3. Present vocabulary concepts.

☐ Discuss vocabulary words and give examples. See student page 404 for definitions and examples.

- *bar graph*
- *circle graph*
- *line graph*

4. Conduct initial learning activity.

☐ Have the students write the answers to questions such as the following: (Round to whole hours based on weekdays only.)

How many hours per day do you attend school?
How many hours per day do you watch TV?
How many hours per day do you work?
How many hours per day do you spend eating?
How many hours per day do you talk on the telephone?
How many hours per day do you sleep?

Add the total time and subtract from 24. This answer goes under *miscellaneous*. (If the answer is over 24 hours, adjust the individual times.) Design a bar graph to display information. (See p. 405.)

Have students determine how many hours per day they watch TV. Construct a line graph with the number of hours on one scale and the days of the week on the other. Each student should graph the number of hours of TV viewing by day. (See p. 405.)

☐ Go to vocabulary list (p. 404) and give an example of each type of graph shown there. The circle will be most difficult. Use this example: Sleep 8 hours 8/24 = 1/3 of the circle, or 1/3 x 360° (which is the number of degrees in the circle) is equal to 120°. Use the degree method when you have a protractor and greater accuracy is desired.

5. Present each graph concept with examples.

Two concepts are presented in Unit 8. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- ☐ Give rationale for learning the skill. Solicit students' input when developing rationale.
- ☐ Give steps in procedure.
- ☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- ☐ Present other examples and actively involve the student.
- ☐ Assign Activity Sheets.
- ☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Selecting an inappropriate scale	*Provide students with sets of data on the board. Ask them to decide on appropriate scales. Examples: 30, 35, 45, 30, 20 (units of five); 4, 8, 10, 16, 20, (units of two); 700, 1100, 200, 3000, (units of 500).*
✗ Omission of labels or inappropriate use of title or labels	*Use graphs found in magazines or newspapers. Ask students questions related to these graphs. Point out that each graph has a title and the scale are always labeled.*
✗ Incorrect computation for angle measure in circle graphs	*Provide drill for making this computation.*

✘ Incorrectly labeling spaces, instead of lines for bar graphs (leading to confusion in marking points)	*Discuss the contrast between bar and line graphs. Point out the need (when using a line graph) for a specific point to be identified.*

7. Reinforce.

Selected reinforcement strategies are listed below.

- When possible, coordinate the teaching of this unit with the social studies classes' coverage of interpreting graphs.
- Extend the initial learning activities. Have students keep track of this data for week. Then have them create graphs to represent their data. Compare with the estimations they used earlier.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on graphs include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

UNIT 8: GRAPHS Answer Keys

Page 401

Graph 1

1 16 reports
2. January (greatest) April (least)
3. 36 reports

Graph 2

1. Sept./Oct.
2. no—decreased
3. August (greatest) December (least)

PAGE 402 **Graph 3**

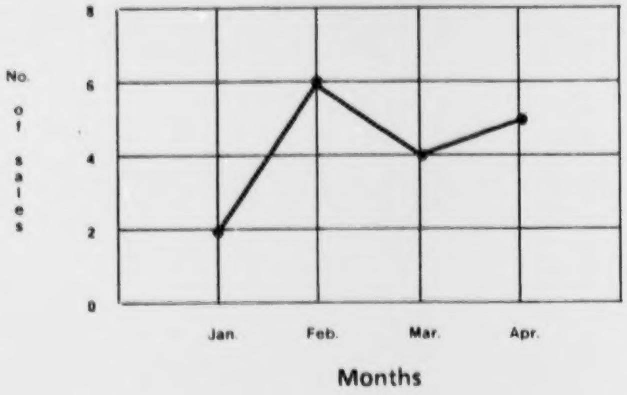
1. 15 points
2. 10 points
3. 45 points

Graph 4

1. 15%
2. $75. 50% of $150 = $75
   $15 – $75 = $75
3. 50%

Page 403

Auto Sales



Page 405 Answers will vary.

Page 406 1. Oct. – 4 1/2 Nov. – 11/2 Dec. – 6

2. 145 3. 18 4. 6

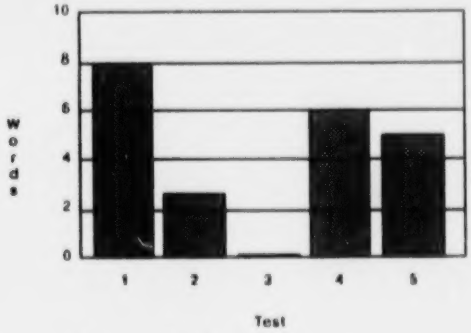
UNIT 8: GRAPHS Answer Keys

Page 407 Refer to student's graph as per scale.

Page 408

1. Temperature changes
2. Line Graph
3. 70°
4. 55°, 9 a.m.
5. 25°
6. Hits – 150
   Walks – 50
   Strike Outs – 70
   Other – 230

Page 409



Page 410

1.

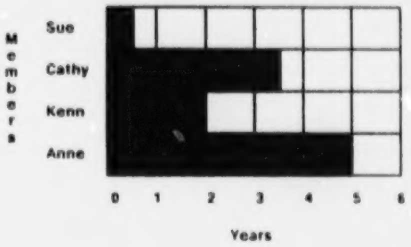
Jan.	138 lb
Feb.	131 lb
Mar.	130 lb
April	128 lb
May	128 lb
June	126 lb
July	124 lb

2. March, May, and June
3. 120 lb
4. Graph 2

Paper	$90.00
Printing	$50.00
Postage	$20.00
Supplies	$40.00

Page 411

Membership Record

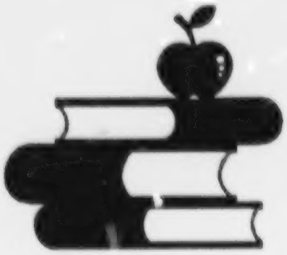


UNIT 9: CENTRAL TENDENCY

UNIT 9: CENTRAL TENDENCY

Overview of Unit 9

What This Unit Covers...



Unit 9 provides instruction to assist students in performing mathematical operations with measures of central tendency. The objective and skills for this unit are listed below.

Objective 7

Demonstrate knowledge of the basic measures of central tendency

Skills: Find the mean of a set of data consisting of no more than five 2-digit numbers.

Find the mode of a set of data consisting of no more than five 2-digit numbers.

Find the median of a set of data consisting of no more than five 2-digit numbers.

Find the range of a set of data consisting of no more than five 2-digit numbers.

UNIT 9: CENTRAL TENDENCY

Unit 9 is comprised of one section. The chart below displays the concepts covered in this unit.

Concepts of Unit 9

1. **Finding the mean**
2. **Finding the mode**
3. **Finding the median**
4. **Finding the range**

Unit Components...

The Teacher's Guide in Unit 9 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

UNIT 9: CENTRAL TENDENCY

Central Tendency

What This Unit Is About...

In this unit students will study four basic measures of central tendency: mean, mode, median, and range.

Scope and Sequence of Unit 9

Events	Activities
1. Determine present level.	Assign Quiz on p. 419.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary terms.	p. 420
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Finding the mean	p. 416
b. Finding the median	p. 417
c. Finding the mode	p. 417
d. Finding the range	p. 418
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 419

UNIT 9: CENTRAL TENDENCY

Suggestions for Teaching...

Suggestions are provided below for teaching the four central tendency concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest on p 419.

Prerequisite Skills for Unit 9

- ✓ Order a set of no more than 5 numbers, including whole and decimal numbers and fractions.
- ✓ Determine the average of a set of numbers.
- ✓ Round decimal numbers.
- ✓ Perform basic operations with whole numbers.

2. Introduce.

☐ A measure of central tendency can be thought of as a single value that summarizes or represents the general significance of a statistical set of unequal values. Mean, median, mode, and range are descriptions of a set of data that tell us respectively, their average, which one is in the middle, which one occurs most frequently, and how spread out they are.

To enhance understanding, have the students tell which statistical measure is implied in statements like these like these:

The most popular brand of soft drink is Quenchers. (mode)
Everyone finished the race within 12 seconds of the winner. (range)
Half the class did better than I on the test. (median)
When we went out to dinner, we split the check six ways. (mean)

3. Present vocabulary concepts.

❑ Discuss vocabulary words and give examples.

- *data*
- *frequency*
- *mean*
- *median*
- *mode*
- *range*
- *statistics*

4. Conduct initial learning activity.

❑ Have students determine their hat sizes to the nearest centimeter using a piece of string and a centimeter ruler, and write the numbers (sizes) on the chalkboard. From this data have students construct a table and tally the number of students having each size. Ask the students to decide the following:

a. the average size hat worn in their class
b. which size would be called "medium"
c. the size worn most often
d. the difference in size from the smallest to largest.

(This activity could be tailored to fit any class by choosing appropriate data to be gathered.)

5. Present each central tendency concept with examples.

Four concepts are presented in Unit 9. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

❑ Give rationale for learning the skill. Solicit students' input when developing rationale.

❑ Give steps in procedure.

❑ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common misconceptions which may lead to errors in problem-solving.

✗ Expecting the mean to be one of the given numbers

✗ Finding the median of a set of data with an *even* number of members

✗ Handling a set of numbers that does not have a mode, or has more than one mode

For each case, present examples very early during instruction which clarify each concept— examples which help students avoid misconceptions—i.e., several sets of data for which the mean is not one of the members, for which the data set has an even number of elements, or for which there is no mode or there is more than one mode.

7. Reinforce.

Selected reinforcement strategies are listed below.

✳ Using index cards and a set of numbers, write one number on each card and mix the order. Have students arrange the set of cards in numerical order and select the median, mode, and range, and calculate the mean. Practice with different sets of data.

✳ Discuss the use of calculators for finding mean, median, mode, and range. Solicit students' opinions on the usefulness of the calculator for each of the concepts. Students should conclude that the calculator is useful only for finding mean and range. Allow the use of calculators for most of these activities.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on central tendency; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

UNIT 9: CENTRAL TENDENCY Answer Keys

Mean, Median, Mode, Range

Page 419	1.		84	
	2.		7	
	3.	a.	6;	
		b.	4.7	
	4.	a.	15	
		b.	34	
	5.		mean is 6	modes are 6, 8, 9
			median is 7	range is 7
Page 421	1.		statistics	
	2.		data	
	3.	a.	range	
		b.	median	
		c.	mean	
		d.	mode	
		e.	frequency	
Page 422	1.	a.	1.14	
		b.	12.8	
	2.	a.	8	
		b.	none	
		C.	5	
	3.	a.	4	
		b.	3.2	
		c.	35	
Page 423	1.	a.	72	
		b.	none	
	2.	a.	7	
		b.	10	
	3.	a.	71°	
		b.	3.6	

Page 424	1.	2.	3.	4.
	a. 3	a. 1.3	a. 19.9	a. 7
	b. 3	b. .9	b. 20	b. 7.5
	c. none	c. .5	c. 18, 23	c. 8, 9

UNIT 9: CENTRAL TENDENCY

Mean, Median, Mode, Range

Page 425	1.	84
	2.	.56
	3.	21.5
	4.	1.7
	5.	7.5
	6.	21.5
	7.	2
	8.	70°
	9.	73°
	10.	76°
Page 426	1.	84
	2.	.5667
	3.	22
	4.	3
	5.	7
	6.	22
Page 427	7.	2
	8.	85
	9.	7
	10.	7
	11.	70°
	12.	72.5°
	13.	76°
	14.	18°

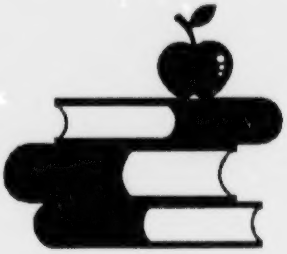
UNIT 10: INTEGERS

Section 1: Addition

Section 2: Multiplication

UNIT 10: INTEGERS

Overview of Unit 10



What This Unit Covers...

Unit 10 provides instruction to assist students in performing mathematical operations with integers. The objective and skills for this unit are listed below.

Objective 8

Compute with integers

Skills: Add two integers having no more than two digits given in either vertical or horizontal form.

Multiply two integers having no more than two digits.

UNIT 10: INTEGERS

Unit 10 is comprised of two sections. The chart below displays the sections and concepts covered in each section for this unit.

Sections and Concepts of Unit 10

Sections	Concepts
Section 1	Addition of integers
Section 2	Multiplication of integers

Unit Components...

The Teacher's Guide in each section of Unit 10 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

Section 1: Addition of Integers

What This Section Is About...

In this section students will study addition of integers. Problems are written both vertically and horizontally with two integers having no more than two digits.

Scope and Sequence of Section 1

Events	Activities
1. Determine present level.	Assign Quiz on p. 435.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary terms.	p. 436
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
• Addition of integers	p. 432
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 435

Suggestions for Teaching...

Suggestions are provided below for teaching the addition of integers concept. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Use quizzes on basic facts in Unit 1 or others as needed.

Prerequisite Skills for Section 1

- ✓ Add whole numbers to two digits.
- ✓ Subtract whole numbers.

2. Introduce.

☐ In the very early years of mankind's existence the counting numbers were conceptualized. Men "counted" livestock and other things, and eventually developed symbols for numbers.

The Chinese are credited with first using the concept of negative numbers. Their notation may have been a number inside a circle, perhaps leading to the financial expression of being "in the hole."

A need for negative numbers is probably clear to most students now. Solicit students' suggestions for ways negative numbers are used today. Being in debt, scorekeeping in many games, and temperatures below zero are just a few situations in which negative numbers would be useful. Positive and negative numbers are used in science, statistics, weather reports, stock reports, sports, and many other fields to express opposite meanings or directions.

3. Present vocabulary concepts.

☐ Discuss vocabulary words and give examples on p. 436.

- *absolute value*
- *common signs*
- *integers*
- *negative*
- *opposite*
- *positive*
- *sign*

4. Conduct initial learning activity.

☐ Review the sets of numbers students have encountered in their mathematical career (prior to integers): counting numbers, whole numbers, fractional numbers, and decimal numbers.

Relate each of these sets to its number line representation. Remind students that a number line is an abstract representation of *all* numbers. In graphing a set, those numbers which *belong* to a set are shown at the same time you show all numbers which *do not belong* by excluding non-members.

Select small sets of numbers with values from zero (0) to ten (10) for students to practice graphing on number lines. Various sets should include whole numbers, fractions, and decimals. Number lines should be drawn with zero on the left, and an arrow at the right indicating the line continues forever; expand the number line to include numbers less than zero—in other words, extend it to the left of zero.

☐ Use such a number line (one having both negative and positive numbers) to demonstrate *addition* of two positive integers, two negative integers, and a positive and negative integer. After several such examples, give students specific examples and have them continue the demonstration.

Follow this activity with one which provides number lines with the *demonstration* already drawn in, and ask students to come up with the *problems* with which to label the line.

☐ Point out that parentheses ( ) are used in textbooks to set off numbers with positive and negative signs to distinguish from subtraction and addition signs.

5. Present the addition of integers concept with examples.

One concept is presented in section 1. The Student's Guide contains the concept with examples and steps. For the concept cover the following:

- ☐ Give rationale for learning the skill. Solicit students' input when developing rationale.
- ☐ Give steps in procedure.
- ☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- ☐ Present other examples and actively involve the student.
- ☐ Assign Activity Sheets.
- ☐ Provide corrective feedback.

6. Address Common Errors

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✘ Confusion of difference between *positive* and *negative* and *plus* and *minus*	*Encourage appropriate word usage and correct terminology.*
✘ Naming the number that represents movement from a non-zero number to another number (on a number line)	*Draw a large number line on the floor or chalkboard. Provide students with a starting point and have them move a given number of units in a positive or negative direction. Ask them to tell where on the number line they end up. Repeat with other numbers.*

✗ Adding numbers with opposite signs	*Allow students to draw a number line as an aid.*

7. **Reinforce.**

Selected reinforcement strategies are listed below.

- Use a vertical number line, with positives above negatives.
- Have students use the change sign key on a calculator or find the opposite of a given number.
- To relate mathematics to the students' lives, have students find examples of the use of positive and negative numbers in newspapers. For each situation, have the students identify the meanings of the given number and then determine the opposite meaning as well.

8. **Summarize.**

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on addition of integers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. **Administer posttest.**

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

Section 2: Multiplication of Integers

What This Section Is About...

In this section students will multiply integers having no more than two integers, learning the rules for the signs.

Scope and Sequence of Section 2

Events	Activities
1. Determine present level.	Assign Quiz on p. 445.
2. Introduce.	See Suggestions for Teaching.
3. Review vocabulary terms.	
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
• Multiplication of integers	p. 444
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 445

Suggestions for Teaching...

Suggestions are provided below for teaching the multiplication of integers concept. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Use test of basic facts in Unit 1 to determine accuracy and speed, if needed.

Prerequisite Skills for Section 2

- ✓ Add whole numbers to two digits.
- ✓ Multiply two-digit numbers.

2. Introduce.

- ☐ Relate multiplication of integers to addition of integers. Review vocabulary.

3. Present vocabulary concepts.

- ☐ Review vocabulary words and give examples.
  - *absolute value*
  - *common signs*
  - *integers*
  - *negative*
  - *opposite*
  - *positive*
  - *sign*
- ☐ Present a vocabulary activity for reinforcement, as appropriate.

4. Conduct initial learning activity.

☐ To introduce the idea of multiplying with a negative number, have students assist in developing a chart like the one below. Use a familiar number at first. Begin with the higher values and proceed to the smaller ones.

5 x 8 = 40
5 x 7 = 35
5 x 6 = 30
5 x 5 = 25
5 x 4 = 20
5 x 3 = ___
5 x 2 = ___
5 x 1 = ___
5 x 0 = ___

Have students fill in the missing values. Then ask, "If we were able to add another line, how would it look?" Students should be able to provide the correct line.

5 x 0 = 0

Ask, "How about the next line? What would it be?" Some students may respond "5 x −1 = −5," but for those who cannot, lead them to see that if the pattern is followed, the next factor, will be "−1," and the corresponding product will be "−5."

Continue, building the chart for a short while, then beginning a new chart, such as the multiples of 10. This should lead the students to see that the product of a negative number with a positive number will be negative.

To develop the concept for multiplying two negatives, begin a chart similar to the one described above, with the following differences (now that they've learned how to multiply a negative and a positive):

−5 x 6 = −30
−5 x 5 = −25
−5 x 4 = −20
−5 x 3 = ___
−5 x 2 = ___
−5 x ___ = ___
+ ___ = ___
+ ___ = ___

Complete and extend this chart to include $^{-}5 \times {}^{-}4 = 20$, thus leading the students to discover the rule for finding the product of two negative numbers.

5. Present the multiplication of integers concept with examples.

One concept is presented in Section 2. The Student's Guide contains concept with examples and steps. For this concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✘ Writing the wrong sign for a product of two or more signed numbers	*Provide drill which requires only that students determine the correct sign of the final product. Include examples having more than two factors. Assist students in discovering a generalization for cases where there is an even number of negative factors and also for cases where there is an odd number of negative factors.*

7. Reinforce.

✻ To enhance understanding, have students compute the second, third, fourth, fifth, and sixth powers of several positive and negative numbers; look for a pattern. That is, any even power of a negative number is positive; and any odd power if a negative number is negative. Then predict the signs of such powers as $(^-2)^{25}$ (negative) and $(^-8)^{30}$ (positive).

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on multiplication of integers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

UNIT 10: INTEGERS — Answer Keys

Section 1: Addition

Page 435
1. ...−1, 0, +1...
2. Signs alike, add and take the common sign. Signs not alike, subtract and use the sign of the larger number.
3. Number without its sign
4. Numbers left of zero on number line
5. +5, −5, +14, −10, −8, −8
6. −9 (−21 +21)
7. left
8. Zero does not have a sign.

Page 437
1. a. add, common
   b. subtract, sign, larger

2. a. 10 b. −5 c. 33 d. −16 e. −25
   f. −13 g. −78 h. −67 i. 57 j. 16
   k. −21 l. −29 m. 121 n. 31 o. −3

3. a. −15
   b. −19
   c. −6

Page 438
1. negative, positive
2. Write no sign
3. a. 7
   b. −13
   c. −7
   d. −172
   e. 0
   f. 37
   g. −8
   h. −100

UNIT 10: INTEGERS

Answer Keys

Section 1: Addition

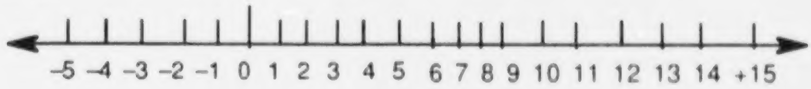
Page 439

1. F
2. T
3. F
4. T
5. T
6. F
7. T
8. T
9. T
10. T

11.	3	12.	⁻7	13.	⁻1	14.	⁻1	15.	19
16.	36	17.	⁻45	18.	1	19.	⁻21	20.	26

Page 440

1. have not, 1 yd, short
2. have, 1 yd, over
3. 20
4.


–5 –4 –3 –2 –1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 +15

Page 441

a.	18	b.	⁻17	c.	⁻2	d.	⁻1
e.	⁻187	f.	183	g.	173	h.	171
i.	6	j.	⁻166	k.	⁻61	l.	⁻6
m.	⁻1						
n.	⁻23						
o.	⁻1						
p.	50						
q.	9						
r.	⁻37						
s.	⁻43						

Section 2: Multiplication

Page 445
1. positive, negative
2. addition
3. multiply
4. multiply
5. multiply
6. multiply
7. −15 8. 12
9. 30 10. 72
11. 30 12. 0

Page 446
1. positive
2. negative
3. positive
4. signs, different
5. negative, positive
6. 9 7. −10
8. 32 9. 32
10. −75 11. 0
12. −55 13. −30
14. negative
15. negative
16. positive

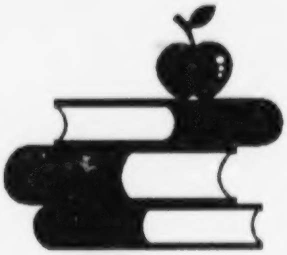
Page 447
1. positive
2. positive
3. negative
4. positive
5. +33
6. −15
7. −125
8. 600
9. −30
10. −64

Page 448
1. positive, negative
2. two
3. + 4. –
5. + 6. –
7. + 8. +
9. – 10. +
11. + 12. –
13. + 14. –
15. –
16. +

UNIT 11: EQUATIONS

UNIT 11: EQUATIONS

Overview of Unit 11



What This Unit Covers...

Unit 11 provides instruction to assist students in performing mathematical operations with equations. The objective and skills for this unit are listed below.

Objective 9

Solve first degree equations with one variable

Skills: Solve equations of the form $ax = b$, where a and b are whole numbers and $a \neq 0$.

Solve equations of the form $ax + b = c$, where a, b, and c are whole numbers and $a \neq 0$.

UNIT 11: EQUATIONS

Unit 11 is comprised of one section. The following chart displays the section and concepts covered in this unit.

Concepts of Unit 11

1. **Solve equations of the form $ax = b$**
2. **Solve equations of the form $x + a = b$**
3. **Solve equations of the form $ax + b = c$**

Unit Components...

The Teacher's Guide in Unit 11 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

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UNIT 11: EQUATIONS

Equations

What This Unit Is About...

In Unit 11 students will practice solving simple equations involving multiplication, addition, and a combination of multiplication and addition.

Scope and Sequence of Unit 11

Events	Activities
1. Determine present level.	Assign Quiz on p. 455.
2. Introduce.	See Suggestions for Teaching.
3. Present vocabulary terms.	p. 456
4. Conduct initial learning activity.	See Suggestions for Teaching.
5. Present concepts and examples.	Assign Activity Sheets.
a. Solve equations of the form $ax = b$	p. 452
b. Solve equations of the form $x + a = b$	p. 453
c. Solve equations of the form $ax + b = c$	p. 454
6. Address common errors.	See Suggestions for Teaching.
7. Reinforce.	See Suggestions for Teaching.
8. Summarize.	See Suggestions for Teaching.
9. Administer posttest.	p. 455

UNIT 11: EQUATIONS

Suggestions for Teaching...

Suggestions are provided below for teaching equation concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills.

Prerequisite Skills for Unit 11

- ✓ Add, multiply, and divide integers and rational numbers.
- ✓ Perform opposite operations of addition and subtraction. and multiplication and division.
- ✓ Identify opposite operations.
- ✓ Perform opposite operations of addition and subtraction and multiplication and division.

2. Introduce.

☐ Although equations should be solved by inspection whenever possible, many students rely on this ability, or on trial and error, to the extent that they do not learn how to transform (or manipulate) equations to discover solutions. Even mathematically inclined students often fall into this "old habit" trap.

Skills of transformation will become necessary as equations become more complex. In addition, the more complicated the equation, the more overtaxed the memory may become if one tries to solve by inspection or by trial and error. It is also important to note that as students progress into algebra, the emphasis shifts from *finding the answer* to *the process used* for finding solutions. Therefore, encourage students to practice writing the steps required to solve equations.

3. Present vocabulary concepts.

☐ Discuss vocabulary words and phrases, and give examples.

- *adding the opposite*
- *equation*
- *isolate the variable*
- *solve*
- *substitution*
- *variable*

4. Conduct initial learning activity.

☐ Have prepared:
  - three small brown bags containing five identical marbles each
  - two bags containing seven marbles
  - four bags containing two marbles each
  - have on hand enough loose marbles for the activity.

Using a balance scale, demonstrate the equation $3x = 15$ by placing the three bags of five marbles each together in one of the trays of the scale, and place 15 loose marbles in the second tray. Tell students that each of the bagged amounts are the same, and solicit ways they could determine the exact marble count in each bag. Remind students that in order to maintain the equality, the scale must remain balanced.

Lead the students to discover that if they divide each tray's contents by three (3), the number of bags, the result will show one bag in the first tray and five (5) marbles in the second tray.

In the same way demonstrate the following two equations: $14 = 2x$ and $4x = 8$.

☐ Discuss the relationship between the rules for multiplication of integers and for dividing integers. Demonstrate that they are the same.

☐ Have prepared three bags with seven, 10, and 20 marbles in them. Using a balance scale, demonstrate the equation $x + 5 = 12$ by placing the bag containing seven marbles together with five loose marbles in one of the trays of the scale, and place loose marbles in the second tray. Solicit ways they could determine the exact marble count in the bag. Remind students that in order to maintain equality, the scale must remain balanced.

In this activity, students will probably want to subtract or "take away" five (5) from each tray. The result will show one bag in the first tray and seven (7) marbles in the second tray, thus there are seven (7) marbles in the bag. Lead the students to discover that if they add the opposite (–5) of the visible contents (5), the result should be the same as subtracting. Encourage the students to use *addition of the opposite* instead of subtraction (since subtraction of integers was not covered in the unit on integers).

In the same way demonstrate the following two equations: $3 + x = 13$ and $28 = x + 8$.

5. Present each equation concept with examples.

Three concepts are presented in Unit 11. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address Common Errors

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ Error when the unknown (variable) is in the right-hand side of the equation	*Present equations in a variety of layouts early in the instructional sequence. (This will also help develop the concept of equality). Examples: 5x + 6 = 16, 16 = 5x + 6, 16 = 6 + 5x . All represent an equality which should look the same if demonstrated using a balance scale.*

7. Reinforce.

Selected reinforcement strategies are listed below.

⁜ Using familiar formulas like those finding area, perimeter, or the conversion from Fahrenheit to Celsius, etc. Instruct students how to make appropriate replacements before attempting to solve for the unknown. For example: Find the width of a rectangle given an area of 24 and a length of 8. Use the formula A = 2l + 2w. Replace l with 8 and A with 23, and solve for w.

$$\begin{aligned} 24 &= 2(8) + 2w \\ 24 &= 16 + 2w \\ 24 + {}^{-}16 &= 16 + {}^{-}16 + 2w \\ 8 &= 0 + 2w \\ 8 &= 2w \\ \frac{8}{2} &= \frac{2w}{2} \\ 4 &= w \end{aligned}$$

Solution: The width is 4.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on rounding decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.

9. Administer posttest.

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

UNIT 11: EQUATIONS

Answer Keys

Page 455	1.	6
	2.	$-1\frac{1}{2}$
	3.	$\frac{1}{2}$
	4.	$\frac{1}{4}$
	5.	-4
Page 457	1.	-2
	2.	$\frac{1}{2}$
	3.	$-\frac{2}{3}$
	4.	-3
	5.	$-\frac{1}{9}$
	6.	$-\frac{1}{5}$
	7.	5
	8.	$-\frac{1}{3}$
	9.	-6
	10.	6

Page 458

1. $\frac{1}{2}$
2. $^{-}2$
3. $-\frac{1}{5}$
4. 5
5. $-\frac{1}{3}$
6. $^{-}9$
7. $-\frac{1}{9}$
8. $^{-}5$
9. $\frac{2}{3}$
10. 2

Page 459

1. $^{-}8$
2. $^{-}32$
3. $^{-}75$
4. 27
5. 58

Page 460

1. $z = -5$
2. $x = 19$
3. $b = 13$
4. $x = -33$
5. $y = -38$
6. $c = -16$
7. $k = -10$
8. $a = 15$
9. $p = 0$
10. $q = 0$

Page 461

1. 4
2. 2

Page 461	3.	-3
	4.	6
	5.	$2\frac{1}{2}$
Page 462	1.	3
	2.	$1\frac{1}{5}$
	3.	-2
	4.	$-1\frac{4}{9}$
	5.	5
Page 463	1.	$-\frac{1}{4}$
	2.	5
	3.	$\frac{2}{3}$
	4.	2
	5.	1
	6.	$\frac{1}{2}$
	7.	$1\frac{1}{6}$
	8.	7
	9.	$1\frac{6}{7}$
	10.	2

APPENDIX

Concepts

Unit	Section	Concepts
1	1	Adding whole numbers
		Rewriting in vertical form to add
		Working real-world word problems
	2	Subtracting whole numbers
		Working real-world word problems
	3	Multiplying with no regrouping
		Multiplying with regrouping
		Working real-world word problems
	4	Dividing whole numbers
		Working real-world word problems
2	1	Simplifying fractions
		Adding like fractions
		Finding common denominators
		Adding fractions with unlike denominators
		Renaming improper fractions as mixed numbers
		Adding fractions with unlike denominators whose sum is an improper fraction
	2	Subtracting proper fractions
		Subtracting whole numbers from mixed numbers
		Subtracting mixed numbers from whole numbers
		Subtracting mixed numbers from mixed numbers
	3	Renaming a mixed number as an improper fraction
		Multiplying two fractions
		Multiplying two fractions, using cross cancelling
		Multiplying fractions, mixed numbers, and whole numbers
	4	Dividing two fractions
		Dividing a fraction and a whole number
		Dividing two mixed numbers
3	1	Adding decimal numbers
	2	Subtracting decimal numbers
	3	Multiplying decimal numbers
	4	Dividing decimal numbers
		Dividing decimal numbers by powers of ten
	5	Rounding decimal numbers
4	1	Write a fraction as an equivalent decimal
		Write a decimal as a percent
		Write a decimal as an equivalent fraction
		Write a percent as a fraction
	2	Find a percent of a whole number
	3	Find a percent of two-place decimal numbers

Unit	Section	Concepts
5	1	Identify basic geometric figures—points, rays, line segments, lines, angles, parallel lines, and perpendicular lines
	2	Identify types of angles—acute, obtuse, right, straight, complementary, and supplementary
		Measure angles using a protractor
		Identify triangles by angles
		Identify triangles by sides
	3	Identify various quadrilaterals—squares, rectangles, parallelograms, rhombi, trapezoids
		Identify pentagons, hexagons, heptagons, and octagons
		Identify congruent and similar polygons
6		Find elapsed time
		Solve problems involving units of distance/length
		Solve problems involving units of capacity
		Solve problems involving units of weight/mass
7	1	Find the perimeter of a polygon
		Find the circumference of a circle
	2	Find the area of a rectangle
		Find the area of a square
		Find the area of a triangle
		Find the area of a parallelogram
		Find the area of a trapezoid
		Find the area of a circle
8		Interpret graphs
		Construct graphs
9		Finding the mean
		Finding the mode
		Finding the median
		Finding the range
10	1	Addition of integers
	2	Multiplication of integers
11		Solve equations of the form $ax = b$
		Solve equations of the form $x + a = b$
		Solve equations of the form $ax + b = c$

Appendix

Unit Correlation to Objectives and Skills

Objectives	Skills	Fully Addressed	Partially Addressed	Not Addressed
1. Demonstrate the ability to compute with whole numbers, decimals, fractions, and percents.	Add no more than 4 numbers up to four digits, regrouping when necessary.	Unit 1		
	Subtract any two whole numbers up to four digits, regrouping when necessary.	Unit 1		
	Multiply a three or more digit number by a two- or three-digit number.	Unit 1		
	Divide a four- or five-digit whole number by a two-digit number including multiples of 10 and 100.	Unit 1		
	Add fractions including whole numbers and mixed numbers less than 100, and proper fractions with denominators 2, 3, 4, 5, 6, 8, or 10.	Unit 2		
	Subtract fractions, including whole numbers and mixed numbers less than 100 and proper fractions with denominators of 2, 3, 4, 5, 6, 8, or 10.	Unit 2		
	Order a given list of no more than three proper fractions with denominators of 2, 3, 4, 5, 6, 8, or 10.			x

Appendix

Unit Correlation to Objectives and Skills

Objectives	Skills	Fully Addressed	Partially Addressed	Not Addressed
1. Demonstrate the ability to compute with whole numbers, decimals, fractions, and percents.	Multiply fractions, including mixed numbers less than 100 denominators less than 100.	Unit 2		
	Divide fractions, including mixed numbers less than 100 with denominators less than 10.	Unit 2		
	Add four five-digit decimal numbers, each having no more than three decimal numbers.	Unit 3		
	Subtract five-digit decimal numbers, each having no more than three decimal places.	Unit 3		
	Multiply two decimal numbers, each having no more than three decimal places.	Unit 3		
	Divide a decimal number named in tenths or hundredths by powers of 10 up to 1000.	Unit 3		
	Divide two numbers, each having no more than two decimal places, where the divisor isless than 100 with no more than two significant digits.	Unit 3		

Appendix

Unit Correlation to Objectives and Skills

Objectives	Skills	Fully Addressed	Partially Addressed	Not Addressed
1. Demonstrate the ability to compute with whole numbers, decimals, fractions, and percents.	Identify a decimal or percent that is equivalent to a proper fraction having a denominator of 2, 3, 4, 5, 20, 25, 50, or 1000	Unit 4		
	Find the percent that one number is of another.			x
	Write whole-number percents as rational numbers.	Unit 4		
	Find the percentage when given a whole number and a whole-number percent less than 100.	Unit 4		
	Find the percentage when given a whole number and a whole-number percent less than 1000.	Unit 4		
	Round a mixed number with a whole number component less than 100 to the nearest whole number.	Unit 3		
	Round a number less than 100 with no more than three decimal places to a designated place.	Unit 3		

Appendix

Unit Correlation to Objectives and Skills

Objectives	Skills	Fully Addressed	Partially Addressed	Not Addressed
2. Demonstrate the ability to solve real-world problems involving whole numbers, decimals, fractions, and percents.	Solve real-world problems involving no more than two whole number operations.	Unit 1	Unit 6	
	Solve real-world problems involving fractions with unlike denominators of 2, 3, 4, 5, 6, 8, or 10.	Unit 2	Unit 6	
	Solve real-world problems involving decimal numbers not to exceed three decimal places using no more than two distinct operations.	Unit 3	Unit 6	
	Solve real-world problems involving percents using no more than two distinct operations and limited to problems concerning simple interest, sales tax, or rate of discount.		Unit 4	
	Solve real-world problems involving averages of no more than 10 numbers and no more than two distinct operations.		Unit 9	
	Estimate answers to real-world problems involving whole numbers, common fractions, or decimal numbers.	Unit 1		

Appendix

Unit Correlation to Objectives and Skills

Objectives	Skills	Fully Addressed	Partially Addressed	Not Addressed
3. Understand basic geometric concepts and relations.	Identify points, rays, line segments, lines, and angles.	Unit 5		
	Identify triangles by angles and sides.	Unit 5		
	Identify quadrilaterals to include squares, rectangles, parallelograms, trapezoids, and rhombi.	Unit 5		
	Identify pentagons, hexagons, and octagons.	Unit 5		
	Identify acute, obtuse,right, straight, complementary, and supplementary angles.	Unit 5		
	Identify parallel and perpendicular lines.	Unit 5		
	Identify congruent and similar polygons.	Unit 5		
	Measure angles less than 180° using a protractor.	Unit 5		
4. Demonstrate the ability to solve problems involving measuring time, distance, capacity, and mass/weight.	Determine the elapsed time between two events stated in seconds, minutes, hours, days, weeks, months, and years.	Unit 6		

Appendix

Unit Correlation to Objectives and Skills

Objectives	Skills	Fully Addressed	Partially Addressed	Not Addressed
4. Demonstrate the ability to solve problems involving measuring time, distance, capacity, and mass/weight.	Solve a problem related to length, width, or height given in a table of metric or customary units up to kilometers or miles (conversion within the system).	Unit 6		
	Solve a problem using capacity using units given in a table (milliliter, liter, teaspoons, tablespoons, cups, pints, quart, gallons) (conversion within the system).	Unit 6		
	Solve a problem involving weight/ mass using units given in a table (milligrams, grams, kilograms, metric tons, ounces, pounds, tons) (conversion within the system).	Unit 6		
	Estimate answers to measurement problems.			x
	Determine length, width, or height by measuring objects to the nearest millimeter or 1/8 inch.			x

Appendix

Unit Correlation to Objectives and Skills

Objectives	Skills	Fully Addressed	Partially Addressed	Not Addressed
5. Demonstrate the ability to solve problems involving area and perimeter.	Find the perimeter of a polygon with no more than eight sides.	Unit 7		
	Find the circumference of a circle (let $\pi \approx 3.14$).	Unit 7		
	Find the area of a rectangle or square.	Unit 7		
	Find the area of a triangle, parallelogram, or trapezoid when given the formula.	Unit 7		
	Find the area of a circle when given the formula (let $\pi \approx 3.14$).	Unit 7		
6. Demonstrate knowledge of line, bar, and circle graphs.	Demonstrate knowledge of line, bar, and circle graphs.	Unit 8		
	Organize data into a line graph, bar graph, or table.	Unit 8		
7. Demonstrate knowledge of the basic measures of central tendency.	Find the mean of a set of data consisting of no more than two-digit numbers.	Unit 9		
	Find the mode of a set of data consisting of no more than five two-digit numbers.	Unit 9		

Appendix

Unit Correlation to Objectives and Skills

Objectives	Skills	Fully Addressed	Partially Addressed	Not Addressed
7. Demonstrate knowledge of the basic measures of central tendency.	Find the median of a set of data consisting of no more than five two-digit numbers.	Unit 9		
	Find the range of a set of data consisting of no more than five two-digit numbers.	Unit 9		
8. Compute with integers.	Add two integers having no more than two digits given in either vertical or horizontal form.	Unit 10		
	Multiply two integers having no more than two digits.	Unit 10		
9. Solve first-degree equations with one variable.	Solve equations of the form $ax = b$, where a and b are whole numbers and $a \neq 0$.	Unit 11		
	Solve equations of the form $ax + b = c$, where a, b, and c are whole numbers and $a \neq 0$.	Unit 11		

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Parallel Alternative Strategies for Students

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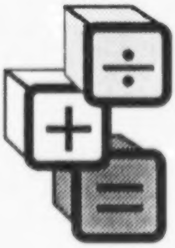

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INTRODUCTION

The *Parallel Alternative Strategies for Students (PASS)*: *Building General Mathematic Skills* is designed as a supplementary text and workbook. *Building General Mathematic Skills* is divided into two books—one for the student and one for the teacher. Each book contains eleven units of study: Whole Numbers, Fractions, Decimals, Percents, Geometry, Measurement, Perimeter/Area, Graphs, Central Tendency, Integers, and Equations.

In the student's book, each unit or section contains a Student's Guide with a suggested plan for the unit. The guide presents each of the mathematic concepts with examples and problem-solving steps. Following the guide are the worksheets—comprised of Quizzes, Vocabulary, Study Sheets, and Activity Sheets.

You may take the Quiz as a pretest to determine your present level. The Quizzes may also be used as a posttest at the end of the section or unit to assess skill mastery. New words are presented on Vocabulary pages; these may include examples to further explain the terms. Some sections have Vocabulary Activities to provide practice to become more familiar with the terms. Study Sheets are found in some units. These contain charts with information organized in a way to help you remember important facts. Activity Sheets are the pages provided to practice each of the concepts presented in the text.

This modified text presents only a limited sample of learning activities. The practice of the skills and application of the concepts will necessarily include other materials. These materials were designed to be sufficiently general and adaptable enough to accompany other textbooks. This book will probably not be used as the primary or complete text. Sections may be selected and used in conjunction with the chosen basic textbook or with the teacher's course outline. Other sections or activities may be omitted, if the teacher desires.

The objectives and skills covered in this *PASS* are correlated to the units and listed in a correlation chart found in the Appendix in the Teacher's Guide. This group of skills was formerly the intended outcomes and student performance standards for the discontinued General Mathematics 1 course no. 1205340.

UNIT 1: WHOLE NUMBERS

Section 1: Addition

Section 2: Subtraction

Section 3: Multiplication

Section 4: Division

Section 1

What This Section is About...

In this section you will practice adding whole numbers. **Whole numbers** are natural numbers such as 0,1,2,3.... Addition problems, in this section, have as many as four numbers. The numbers added (addends) will have no more than four digits; so, the largest possible addend will be 9,999.

Suggested Plan

Checkpoints	Activities
✓ Do I have the necessary prerequisite skills?	✓ Take Quiz.
✓ What concepts will be presented? 1. Adding whole numbers 2. Rewriting in vertical form to add 3. Working real-world word problems	✓ See examples on the following pages.
✓ How much do I already know?	✓ Take Quiz as pretest.
✓ What vocabulary words are introduced?	✓ See Vocabulary.
✓ What practice is provided?	✓ Do Activity Sheets.
✓ What if I need extra help?	✓ Refer to examples in this section.
✓ Have I mastered these concepts?	✓ Take Quiz as posttest.

Concept: **Adding Whole Numbers Written In Vertical Form**

?

How do you add whole numbers already written in vertical form?

Example:

$$\begin{array}{r} 283 \\ 55 \\ 232 \\ \underline{83} \end{array}$$

Step 1: Add each column starting from top to bottom with the ones' place at the far right. If the sum of any column is ten or more, write the last digit of the sum in the answer column and carry the other digit to the next column to the left.

The sum of the ones' column (3 + 5 + 2 + 3) is 13; write the 3 in the answer column and carry the 1.

$$\begin{array}{r} \mathit{1} \\ 283 \\ 55 \\ 232 \\ \underline{+\ 83} \\ 3 \end{array} \downarrow$$

The sum of the tens' column (1 + 8 + 5 + 3 + 8) is 25 so write the 5 in the answer column and carry the 2.

$$\begin{array}{r} \mathit{2\ 1} \\ 283 \\ 55 \\ 232 \\ \underline{+\ 83} \\ 53 \end{array}$$

The sum of the hundreds' column (2 + 2 + 2) is 6. So write the 6 in the answer column.

$$\begin{array}{r} \mathit{2\ 1} \\ 283 \\ 55 \\ 232 \\ \underline{+\ 83} \\ 653 \end{array}$$

Step 2: Check by making a second attempt on a separate sheet of paper and adding from *bottom* to *top*.

$$\begin{array}{r l l}
{\scriptstyle 2\,1\,\,} & & \\
283 & \uparrow & (3+2+5+3=13) \\
55 & & (8+3+5+8+1=25) \\
232 & & (2+2+2=6) \\
+\ 83 & & \\
\hline
653 & &
\end{array}$$

Concept: Rewriting the Problem in Vertical Form to Add

?

How do you add whole numbers not written in vertical form?

Example: 849 + 79 + 707 =

Step 1: Rewrite each horizontally written problem in vertical form.

$$\begin{array}{r}
849 \\
79 \\
+\ \underline{707}
\end{array}$$

Step 2: Check to make sure all digits in each number are written in the correct place.

$$\begin{array}{r}
849 \\
79 \\
+707 \\
\hline
\end{array}$$

Step 3: Use the addition strategy to find and check the sums.

$$\begin{array}{r c r c}
{\scriptstyle 1\,2\,\,} & \quad & {\scriptstyle 1\,2\,\,} & \\
849 & & 849 & \uparrow \\
79 & & 79 & \\
+707 & & +707 & \\
\hline
1635 & & 1635 &
\end{array}$$

Concept

Working Real-World Addition Problems

?

What steps do you use to work real-world problems?

Step 1: Read the problem.

South High School had four home basketball games during January. There were 5,225 people who attended the first game; 3,450 the second game; 4,317 the third game; and 5,625 the fourth game. How many people attended all four home basketball games?

Step 2: Circle key words.

- how many
- all

South High School had four home basketball games during January. There were 5,225 people who attended the first game; 3,450 the second game; 4,317 the third game, and 5,625 the fourth game. **How many** people attended **all** four home basketball games?

Step 3: Underline the question or what is being asked.

South High School had four home basketball games during January. There were 5,225 people who attended the first game; 3,450 the second game; 4,317 the third game; and 5,625 the fourth game. How many people attended all four home basketball games?

Step 4: Determine the operation.

This problem requires ***addition.***

Step 5: Write a number sentence. (Draw pictures if needed.)

Game 1		Game 2		Game 3		Game 4	
5,225	+	3,450	+	4,317	+	5,625	=

Step 6: Compute the answer.

$$\begin{array}{r} 5{,}225 \\ 3{,}450 \\ 4{,}317 \\ +\ \underline{5{,}625} \\ 18{,}617 \end{array}$$

Step 7: Reread and ask: "Is the answer reasonable?"

Round to whole numbers and estimate:

5,000 + 3,000 + 4,000 + 6,000 = 18,000

Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. *Caution*: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

The answer is 18,617.

Quiz

Directions: You will be given three minutes to answer correctly as many facts as you can. Do not begin until you are instructed to do so. Write the answer under the problem.

9 + 1	7 + 1	5 + 3	4 + 3	6 + 9	4 + 7	5 + 9	8 + 7
3 + 1	4 + 8	3 + 9	7 + 6	2 + 1	9 + 7	4 + 5	2 + 6
2 + 5	5 + 5	9 + 2	1 + 1	6 + 4	3 + 2	5 + 2	7 + 5
4 + 1	1 + 2	4 + 6	7 + 2	2 + 2	8 + 6	9 + 8	3 + 3
5 + 5	1 + 5	7 + 7	5 + 8	8 + 1	4 + 4	2 + 7	6 + 2
9 + 9	3 + 7	8 + 9	1 + 3	9 + 3	7 + 3	6 + 5	8 + 8
1 + 4	6 + 8	5 + 1	2 + 8	6 + 7	2 + 3	8 + 2	3 + 4
4 + 2	1 + 6	5 + 6	8 + 3	1 + 7	9 + 4	7 + 4	6 + 1
1 + 8	9 + 5	2 + 9	6 + 6	7 + 8	3 + 5	8 + 4	3 + 8
5 + 7	2 + 4	8 + 5	3 + 3	6 + 3	9 + 6	4 + 9	7 + 9

Quiz

Directions: Add.

1. $\begin{array}{r} 426 \\ +244 \\ \hline \end{array}$

2. $\begin{array}{r} 435 \\ +332 \\ \hline \end{array}$

3. $\begin{array}{r} 436 \\ +453 \\ \hline \end{array}$

4. $\begin{array}{r} 525 \\ +346 \\ \hline \end{array}$

5. $\begin{array}{r} 249 \\ +427 \\ \hline \end{array}$

6. $\begin{array}{r} 425 \\ +493 \\ \hline \end{array}$

7. $\begin{array}{r} 396 \\ +282 \\ \hline \end{array}$

8. $\begin{array}{r} 625 \\ +293 \\ \hline \end{array}$

9. $\begin{array}{r} 614 \\ +932 \\ \hline \end{array}$

10. $\begin{array}{r} 506 \\ +792 \\ \hline \end{array}$

11. $\begin{array}{r} 699 \\ +143 \\ \hline \end{array}$

12. $\begin{array}{r} 589 \\ +435 \\ \hline \end{array}$

13. $\begin{array}{r} 948 \\ +9287 \\ \hline \end{array}$

14. $\begin{array}{r} 3462 \\ +4189 \\ \hline \end{array}$

15. $\begin{array}{r} 4646 \\ +1283 \\ \hline \end{array}$

16. $\begin{array}{r} 34 \\ 10 \\ +24 \\ \hline \end{array}$

17. $\begin{array}{r} 25 \\ 18 \\ +28 \\ \hline \end{array}$

18. $\begin{array}{r} 432 \\ 154 \\ +494 \\ \hline \end{array}$

19. $\begin{array}{r} 584 \\ 612 \\ +943 \\ \hline \end{array}$

20. $\begin{array}{r} 2187 \\ 8292 \\ +1324 \\ \hline \end{array}$

21. 72 + 24 + 31 + 92 = ________

22. 209 + 413 + 184 + 431 = ________

23. 3714 + 4540 + 2184 + 1923 = ________

24. 3421 + 1843 + 1510 + 2643 = ________

25. 3147 + 2375 + 1182 + 4214 = ________

Vocabulary

☞ **Directions:** Read and study.

carrying — to transfer from one column to the next; also called regrouping

finite — can be counted or measured

infinite — cannot be counted or measured

natural or counting numbers — {1, 2, 3...}

one-to-one correspondence — the relationship between the number of things in a group and the natural numbers (1, 2, 3...)

sum — the numbers obtained by adding numbers; the result of addition

whole numbers — natural numbers together with zero {0, 1, 2, 3...}

zero — last numeral to be invented; the absence of quantity; nothing

Vocabulary Activity

☞ **Directions:** Fill in each blank with one of the words from the vocabulary list.

1. The __________ __________ do not include the symbol for zero.

2. The number of stars in the sky is __________ because there are too many stars to count.

3. The number of students in this class is __________ because the students can all be counted.

4. The set of __________ __________ includes zero.

5. When you transfer one column to the next, you are __________.

6. The answer to an addition problem is called the __________.

7. The absence of quantity is called __________.

Activity Sheet

☞ **Directions:** Replace each numeral below with a corresponding numeral from the system that your group developed. Then, add each problem.

Example:

$$\begin{array}{rr} 1 & \bigstar \\ +2 & \blacktriangle \\ \hline 3 & \rightarrow \end{array}$$

1. $\begin{array}{r} 3 \\ +\ 5 \\ \hline \end{array}$

2. $\begin{array}{r} 2 \\ +\ 4 \\ \hline \end{array}$

3. $\begin{array}{r} 1 \\ +\ 6 \\ \hline \end{array}$

4. $\begin{array}{r} 7 \\ +\ 8 \\ \hline \end{array}$

5. $\begin{array}{r} 1 \\ +\ 9 \\ \hline \end{array}$

6. $\begin{array}{r} 3 \\ +\ 3 \\ \hline \end{array}$

7. $\begin{array}{r} 6 \\ +\ 5 \\ \hline \end{array}$

8. $\begin{array}{r} 5 \\ +\ 8 \\ \hline \end{array}$

9. $\begin{array}{r} 8 \\ +\ 9 \\ \hline \end{array}$

10. $\begin{array}{r} 9 \\ +\ 5 \\ \hline \end{array}$

Activity Sheet

☞ **Directions:** Add.

1.
$$\begin{array}{r} 4246 \\ 6928 \\ 2288 \\ +\ 7578 \\ \hline \end{array}$$

2.
$$\begin{array}{r} 6926 \\ 1611 \\ 6337 \\ +\ 911 \\ \hline \end{array}$$

3.
$$\begin{array}{r} 5640 \\ 60 \\ 9 \\ +\ 926 \\ \hline \end{array}$$

4.
$$\begin{array}{r} 503 \\ 8 \\ 55 \\ +\ 1448 \\ \hline \end{array}$$

☞ **Directions:** Find the sum of:

5. 86; 153; 7,128; 249 ______________

6. 1,469; 8,355; 2,076; 123 ______________

7. 37; 382; 8,500; 175 ______________

8. Twelve hundred, twenty-eight *and* forty seven ______________

9. One hundred ninety-four; eighteen; six thousand, four hundred; *and* fifty-five ______________

10. Six hundred twenty; seven hundred twelve; eighty; *and* two thousand, eight hundred thirty-nine ______________

Activity Sheet

Directions: Add.

1. $$\begin{array}{r} 611 \\ 17 \\ +\ 6926 \\ \hline \end{array}$$

2. $$\begin{array}{r} 79 \\ 2288 \\ +\ 911 \\ \hline \end{array}$$

3. $$\begin{array}{r} 4973 \\ 87 \\ 564 \\ +\ 9 \\ \hline \end{array}$$

4. $$\begin{array}{r} 6445 \\ 896 \\ 7 \\ +\ 39 \\ \hline \end{array}$$

5. $$\begin{array}{r} 65 \\ 8 \\ 3467 \\ +\ 784 \\ \hline \end{array}$$

6. $$\begin{array}{r} 7509 \\ 26 \\ 727 \\ +\ 8 \\ \hline \end{array}$$

7. $$\begin{array}{r} 1488 \\ 80 \\ 175 \\ +\ 19 \\ \hline \end{array}$$

8. $$\begin{array}{r} 858 \\ 24 \\ 7468 \\ +\ 18 \\ \hline \end{array}$$

9. $$\begin{array}{r} 4246 \\ 801 \\ +\ 48 \\ \hline \end{array}$$

10. $$\begin{array}{r} 1945 \\ 6603 \\ 550 \\ +\ 392 \\ \hline \end{array}$$

Activity Sheet

Directions: Add.

1.

$$\begin{array}{r} 86 \\ 43 \\ 51 \\ 88 \\ +15 \\ \hline \end{array}$$

2.

$$\begin{array}{r} 26 \\ 98 \\ 77 \\ 95 \\ +73 \\ \hline \end{array}$$

3.

$$\begin{array}{r} 654 \\ 408 \\ +442 \\ \hline \end{array}$$

4.

$$\begin{array}{r} 637 \\ 214 \\ +685 \\ \hline \end{array}$$

5.

$$\begin{array}{r} 778 \\ 585 \\ 443 \\ +457 \\ \hline \end{array}$$

6.

$$\begin{array}{r} 634 \\ 478 \\ 692 \\ +803 \\ \hline \end{array}$$

7.

$$\begin{array}{r} 3292 \\ 7529 \\ +9835 \\ \hline \end{array}$$

8.

$$\begin{array}{r} 6254 \\ 5883 \\ +4887 \\ \hline \end{array}$$

9.

$$\begin{array}{r} 5792 \\ 6218 \\ 7426 \\ +3078 \\ \hline \end{array}$$

10.

$$\begin{array}{r} 5129 \\ 4595 \\ 6334 \\ +4762 \\ \hline \end{array}$$

Activity Sheet

Directions: Use the example in the Student's Guide to add and check the following problems.

1. 827 + 633 = ____________
2. 962 + 8521 + 16 = ____________
3. 2187 + 8292 + 1324 = ____________
4. 3421 + 1843 + 1510 + 2643 = ____________
5. 209 + 413 + 184 + 431 = ____________
6. 73 + 62 + 18 = ____________
7. 394 + 24,631 = ____________
8. 2643 + 8596 + 3666 = ____________
9. 9436 + 3621 = ____________
10. 624 + 18 + 3555 + 4679 = ____________

Word Problems

☞ **Directions:** Use the eight steps below for solving addition word problems.

Step 1: Read the problem.

Step 2: Circle key words and phrases.

deposited
increased by
sum
total
how many (in all)
plus
altogether

Step 3: Underline the objective statement or question (what is being asked).

Step 4: Determine the operation.

Step 5: Write a number sentence. (Draw pictures if needed.)

Step 6: Compute the answer.

Step 7: Reread, and ask: "Is the answer reasonable?"

Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. *Caution:* your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

Word Problems

☞ **Directions**: Follow the eight steps on page 18 to solve the problems.

1. John drove 419 miles in one week. The second week he drove 389 miles. The third week he drove 653 miles. What was the total number of miles that he drove?

   ____

2. There were 42,987 people at Saturday's football game and 5,795 seats were empty. What was the total seating capacity of the stadium?

   ____

3. Paul and Joan were selling sodas at a football game. He sold 1,122 sodas. She sold 3,239. What was the total number of sodas sold?

   ____

4. Tom's farm contained 2,128 pine trees, 539 maple trees, and 2,454 birch trees. How many trees were there in all?

   ____

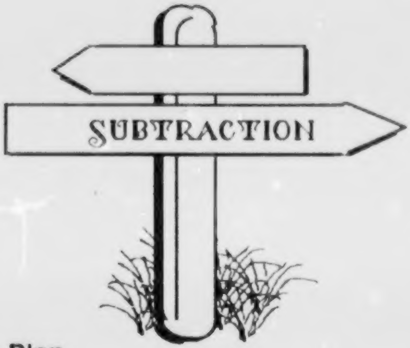
5. The college's drama class gave four performances of the play. There were 921 at the first performance. The second had 1,539; the third had 789. The last one had 1,475. How many people went to the four performances?

   ____

Section 2

What This Section is About...

In this section you will practice subtracting whole numbers. **Whole numbers** are natural numbers or integers such as 0, 1, 2, 3.... In this section you will subtract whole numbers having up to four digits. Regrouping will be necessary.



Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Subtracting whole numbers 2. Working real-world word problems	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Subtracting Whole Numbers**

?

How do you subtract whole numbers?

Example: Subtract 5404 – 3586

Step 1: Rewrite the problem vertically, if necessary.

$$\begin{array}{r} 5404 \\ \underline{-3586} \end{array}$$

Step 2: Subtract each column, starting at the right with the ones' place. If the digit on the top is smaller than the digit on bottom, borrow one from the column to the left.

$$\begin{array}{r} 5\overset{3}{\cancel{4}}\overset{3}{\cancel{0}}\overset{14}{\cancel{4}} \\ \underline{3586} \\ 8 \end{array} \qquad \begin{array}{r} 5\overset{3}{\cancel{4}}\overset{9}{\cancel{0}}\overset{14}{\cancel{4}} \\ \underline{3586} \\ 18 \end{array} \qquad \begin{array}{r} \overset{4}{\cancel{5}}\overset{13}{\cancel{4}}\overset{9}{\cancel{0}}\overset{14}{\cancel{4}} \\ \underline{3586} \\ 818 \end{array} \qquad \begin{array}{r} \overset{4}{\cancel{5}}\overset{13}{\cancel{4}}\overset{9}{\cancel{0}}\overset{14}{\cancel{4}} \\ \underline{3586} \\ 1818 \end{array}$$

Step 3: Check your answer by adding the bottom number in the problem to the difference. If the sum is the same as the top number in the problem, your answer is correct.

$$\rightarrow \begin{array}{r} 5404 \\ \underline{-3586} \\ 1818 \end{array} \qquad\qquad \begin{array}{r} 3586 \\ \underline{+1818} \\ 5404 \end{array} \leftarrow$$

Concept: **Working Real-World Subtraction Problems**

?

What steps do you use to work real-world word problems?

Step 1: Read the problem.

In the student government election, Jean received 1,206 votes, and Mike 988 votes. How many fewer votes did Mike receive?

Step 2: Circle key words.

🔑 • **fewer**

In the student government election, Jean received 1,206 votes, and Mike 988 votes. How many **fewer** votes did Mike receive?

Step 3: Underline the question or what is being asked.

In the student government election, Jean received 1,206 votes, and Mike 988 votes. How many fewer votes did Mike receive?

Step 4: Determine the operation.

This problem requires subtraction.

Step 5: Write a number sentence. (Draw pictures if needed.)

1206 − 988

Step 6: Compute the answer.

$$\begin{array}{r} 1206 \\ -\ 988 \\ \hline 218 \end{array}$$

Step 7: Reread and ask: "Is the answer reasonable?"

Round to whole numbers and estimate:

1200 − 1000 = 200

Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. *Caution*: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

The answer is 218 votes.

Quiz

Directions: You will be given three minutes to answer correctly as many facts as you can. Do not begin until you are instructed to do so. Write the answer under the problem.

11 - 9	17 - 8	15 - 6	13 - 4	14 - 5	16 - 7	12 - 3	6 - 5
14 - 6	11 - 3	10 - 1	10 - 7	16 - 8	11 - 2	13 - 9	8 - 2
12 - 5	12 - 4	19 - 9	13 - 5	9 - 1	10 - 8	3 - 1	5 - 4
7 - 1	10 - 9	10 - 3	15 - 7	10 - 2	17 - 9	9 - 2	9 - 7
13 - 6	8 - 1	11 - 7	11 - 4	15 - 8	7 - 2	11 - 8	12 - 6
6 - 1	9 - 3	14 - 9	11 - 5	11 - 6	8 - 5	5 - 3	7 - 6
5 - 1	12 - 7	3 - 2	6 - 3	9 - 8	10 - 4	16 - 9	6 - 4
5 - 2	8 - 3	10 - 6	14 - 8	6 - 2	8 - 7	7 - 5	14 - 7
12 - 8	4 - 1	15 - 9	10 - 5	9 - 4	7 - 3	7 - 4	12 - 9
4 - 2	9 - 6	8 - 4	4 - 3	8 - 6	13 - 8	9 - 5	13 - 7

Quiz

Directions: Subtract.

1. $\begin{array}{r} 756 \\ -234 \\ \hline \end{array}$

2. $\begin{array}{r} 745 \\ -416 \\ \hline \end{array}$

3. $\begin{array}{r} 967 \\ -371 \\ \hline \end{array}$

4. $\begin{array}{r} 406 \\ -257 \\ \hline \end{array}$

5. $\begin{array}{r} 4626 \\ -512 \\ \hline \end{array}$

6. $\begin{array}{r} 4848 \\ -425 \\ \hline \end{array}$

7. $\begin{array}{r} 4357 \\ -138 \\ \hline \end{array}$

8. $\begin{array}{r} 4724 \\ -273 \\ \hline \end{array}$

9. $\begin{array}{r} 6753 \\ -902 \\ \hline \end{array}$

10. $\begin{array}{r} 6424 \\ -286 \\ \hline \end{array}$

11. $\begin{array}{r} 8652 \\ -937 \\ \hline \end{array}$

12. $\begin{array}{r} 6053 \\ -782 \\ \hline \end{array}$

13. $\begin{array}{r} 3356 \\ -1132 \\ \hline \end{array}$

14. $\begin{array}{r} 5000 \\ -1429 \\ \hline \end{array}$

15. $\begin{array}{r} 3675 \\ -1294 \\ \hline \end{array}$

16. $\begin{array}{r} 6677 \\ -2923 \\ \hline \end{array}$

17. $\begin{array}{r} 7802 \\ -3254 \\ \hline \end{array}$

18. $\begin{array}{r} 8797 \\ -1898 \\ \hline \end{array}$

19. $\begin{array}{r} 7524 \\ -1321 \\ \hline \end{array}$

20. $\begin{array}{r} 4723 \\ -2308 \\ \hline \end{array}$

21. 8243 − 4152 = ________

22. 8245 − 1913 = ________

23. 96,762 − 8341 = ________

24. 7545 − 2837 = ________

Vocabulary

☞ **Directions**: Study the words and definitions.

borrowing — to take one from the digit immediately to the left and add its place value to the digit from which you're subtracting; also called regrouping

$$\begin{array}{r} \overset{3}{\cancel{4}}\,\overset{10}{0} \\ -\ \underline{1\,7} \end{array}$$

difference — the numbers obtained by subtracting the answer to a subtraction problem; the result of subtraction

$$\begin{array}{r} 2\,7 \\ -\ \underline{1\,2} \\ 1\,5 \end{array} \longleftarrow$$

regrouping — borrowing; renaming

renaming — borrowing; regrouping

subtract — to take away or reduce by a set amount

☐ ☐ ☐ ☒ ☒

Activity Sheet

Directions: Write **S** for **Subtract**, if the following sentences suggest subtraction; Write **N** for **No**, if they do *not* suggest subtraction.

________ 1. Depositing money in a checking account.

________ 2. Writing a check to take money out of a checking account.

________ 3. A downpayment on a car to make the total amount owed less.

________ 4. An increase in pay.

________ 5. The amount of fuel used as a plane flies.

________ 6. The amount of water in a lake when it is raining.

________ 7. The amount of water in a lake when the sun is shining.

________ 8. Getting docked for missing days of work.

________ 9. Getting two new shirts for Christmas.

________ 10. Losing change through a hole in your pocket.

Activity Sheet

Directions: Use the example in the Student's Guide to subtract and check the following problems.

1. $$\begin{array}{r} 7553 \\ -\ 221 \\ \hline \end{array}$$

2. $$\begin{array}{r} 6813 \\ -\ 402 \\ \hline \end{array}$$

3. $$\begin{array}{r} 4462 \\ -\ 235 \\ \hline \end{array}$$

4. $$\begin{array}{r} 4253 \\ -\ 147 \\ \hline \end{array}$$

5. $$\begin{array}{r} 3710 \\ -\ 340 \\ \hline \end{array}$$

6. $$\begin{array}{r} 8642 \\ -\ 271 \\ \hline \end{array}$$

7. $$\begin{array}{r} 5295 \\ -4724 \\ \hline \end{array}$$

8. $$\begin{array}{r} 4007 \\ -3805 \\ \hline \end{array}$$

8. $$\begin{array}{r} 6000 \\ -4537 \\ \hline \end{array}$$

10. $$\begin{array}{r} 2413 \\ -1858 \\ \hline \end{array}$$

11. 7354 − 232 = ________

12. 5541 − 538 = ________

13. 3817 − 454 = ________

14. 9381 − 1470 = ________

15. 4607 − 3858 = ________

Activity Sheet

Directions: Subtract and check the following problems.

1. $\begin{array}{r} 848 \\ -\ 42 \\ \hline \end{array}$

2. $\begin{array}{r} 435 \\ -\ 38 \\ \hline \end{array}$

3. $\begin{array}{r} 472 \\ -\ 273 \\ \hline \end{array}$

4. $\begin{array}{r} 9023 \\ -3655 \\ \hline \end{array}$

5. $\begin{array}{r} 6001 \\ -3675 \\ \hline \end{array}$

6. $\begin{array}{r} 923 \\ -\ 677 \\ \hline \end{array}$

7. $\begin{array}{r} 3000 \\ -\ 9 \\ \hline \end{array}$

8. $\begin{array}{r} 674 \\ -\ 7 \\ \hline \end{array}$

9. $\begin{array}{r} 5395 \\ -\ 59 \\ \hline \end{array}$

10. $\begin{array}{r} 2006 \\ -\ 8 \\ \hline \end{array}$

11. $\begin{array}{r} 5010 \\ -4298 \\ \hline \end{array}$

12. $\begin{array}{r} 7432 \\ -\ 803 \\ \hline \end{array}$

13. $\begin{array}{r} 8652 \\ -\ 93 \\ \hline \end{array}$

14. $\begin{array}{r} 8701 \\ -\ 898 \\ \hline \end{array}$

15. $\begin{array}{r} 2923 \\ -1913 \\ \hline \end{array}$

Activity Sheet

Directions: Subtract and check the following problems.

1. $\begin{array}{r} 7355 \\ -\ 224 \\ \hline \end{array}$

2. $\begin{array}{r} 8631 \\ -\ 420 \\ \hline \end{array}$

3. $\begin{array}{r} 253 \\ -\ 126 \\ \hline \end{array}$

4. $\begin{array}{r} 628 \\ -\ 29 \\ \hline \end{array}$

5. $\begin{array}{r} 4231 \\ -2453 \\ \hline \end{array}$

6. $\begin{array}{r} 5154 \\ -\ 84 \\ \hline \end{array}$

7. $\begin{array}{r} 4189 \\ -\ 768 \\ \hline \end{array}$

8. $\begin{array}{r} 6009 \\ -5296 \\ \hline \end{array}$

9. $\begin{array}{r} 4610 \\ -\ 340 \\ \hline \end{array}$

10. From 1518 take 341 __________

11. Take 75 from 322 __________

12. Take 4518 from 5831__________

13. From 7381 take 545__________

14. From 4728 take 2581 __________

15. Take 858 from 7604__________

Activity Sheet

Directions: Subtract and check the following problems.

1. $\begin{array}{r} 798 \\ -600 \\ \hline \end{array}$

2. $\begin{array}{r} 1281 \\ -613 \\ \hline \end{array}$

3. $\begin{array}{r} 6397 \\ -1649 \\ \hline \end{array}$

4. $\begin{array}{r} 857 \\ -370 \\ \hline \end{array}$

5. $\begin{array}{r} 4470 \\ -721 \\ \hline \end{array}$

6. $\begin{array}{r} 936 \\ -708 \\ \hline \end{array}$

7. $\begin{array}{r} 2357 \\ -909 \\ \hline \end{array}$

8. $\begin{array}{r} 8190 \\ -6514 \\ \hline \end{array}$

9. $\begin{array}{r} 2142 \\ -715 \\ \hline \end{array}$

10. $\begin{array}{r} 548 \\ -260 \\ \hline \end{array}$

11. $\begin{array}{r} 3420 \\ -1807 \\ \hline \end{array}$

12. $\begin{array}{r} 6386 \\ -727 \\ \hline \end{array}$

13. $\begin{array}{r} 5490 \\ -962 \\ \hline \end{array}$

14. $\begin{array}{r} 5000 \\ -4692 \\ \hline \end{array}$

15. $\begin{array}{r} 4045 \\ -2609 \\ \hline \end{array}$

16. $\begin{array}{r} 7155 \\ -816 \\ \hline \end{array}$

17. 837 − 451 = ________

18. 8760 − 933 = ________

19. 8372 − 5833 = ________

20. 4006 − 3897 = ________

Word Problems

Directions: Use the steps below for solving subtraction word problems.

Step 1: Read the problem.

Step 2: Circle key words and phrases.

difference
reduced by
fewer
left
decrease
how many more
how many less
minus

Step 3: Underline the objective statement or question (what is being asked).

Step 4: Determine the operation.

Step 5: Write a number sentence. (Draw pictures if needed.)

Step 6: Compute the answer.

Step 7: Reread, and ask: "Is the answer reasonable?"

Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. *Caution:* your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

Word Problems

Directions: Follow the steps on page 18 or 33. Add or subtract to find the solutions to the problems below.

1. A truck driver drove 528 miles on the first trip and 746 on the next. How many miles did the truck driver drive all together?

   ____

2. Last month three jets were flown the following number of miles: 42,168; 5,214; and 83,652. What was the total number of miles flown?

   ____

3. There are 2,651 students enrolled at Madison High School; of these, 269 are girls. How many are boys?

   ____

4. At the end of last year the odometer reading on your car was 33,843. You drove your car 29,584 miles last year. What was the reading at the beginning of last year?

   ____

5. Last year 68,198 orders for yo-yos were shipped from the warehouse. So far this year 9,958 orders have been shipped. How many orders must be shipped this year to match the total for last year?

   ____

6. The odometer in Arnie's car reads 52,611, the odometer in Ken's car reads 38,999. How many more miles are on Arnie's car than on Ken's?

   ____

7. In two weeks Mr. Fish carrried the following number of passengers on his bus: 4,216; 3,584; and 7,821. What was the total number of passengers carried in two weeks?

   ____

Section 3

What This Section is About...

In this section you will practice multiplying whole numbers. **Whole numbers** are natural numbers or integers such as 0, 1, 2, 3.... You will multiply a three-digit number by a two- or three-digit number.

MULTIPLICATION

Suggested Plan

Checkpoints	Activities
✓ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✓ What concepts will be presented? 1. Multiplying with no regrouping 2. Multiplying with regrouping 3. Working real-world word problems	✍ See examples on the following pages.
✓ How much do I already know?	✍ Take Quiz as pretest.
✓ What vocabulary words are introduced?	✍ See Vocabulary.
✓ What practice is provided?	✍ Do Activity Sheets.
✓ What if I need extra help?	✍ Refer to examples in this section.
✓ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Multiplication With No Regrouping**

?

How do you multiply whole numbers with no regrouping?

Example: Multiply: 321 x 242 =

Step 1: Rewrite the problem in vertical form.

$$\begin{array}{r} 3\,2\,1 \\ \underline{\times\,2\,4\,2} \end{array}$$

Step 2: Draw a grid to align partial products.

$$\begin{array}{r|c|l} 3 & 2 & 1 \\ \times\,2 & 4 & 2 \\ \hline & & \\ & & \end{array}$$

Step 3: Find the bottom digit in the ones' place and multiply it times the top digit.

$$\begin{array}{r|c|l} 3 & 2 & 1 \\ \times\,2 & 4 & \mathbf{2} \\ \hline 6 & 4 & 2 \end{array}$$

Step 4: Place a zero under the number in the ones' place.

$$\begin{array}{r|c|l} 3 & 2 & 1 \\ \times\,2 & 4 & 2 \\ \hline 6 & 4 & 2 \\ & & \mathbf{0} \end{array}$$

Step 5: Multiply the bottom digit in the tens' place times each top digit.

$$\begin{array}{rrr|r|r}
 & & 3 & 2 & 1 \\
 & \times & 2 & 4 & 2 \\ \hline
 & & 6 & 4 & 2 \\
1 & 2 & 8 & 4 & 0
\end{array}$$

Step 6: Place zeros under the ones' and tens' places.

$$\begin{array}{rrr|r|r}
 & & 3 & 2 & 1 \\
 & \times & 2 & 4 & 2 \\ \hline
 & & 6 & 4 & 2 \\
1 & 2 & 8 & 4 & 0 \\
 & & & 0 & 0
\end{array}$$

Step 7: Multiply the bottom digit in the hundreds' place times each top digit.

$$\begin{array}{rrr|r|r}
 & & 3 & 2 & 1 \\
 & \times & 2 & 4 & 2 \\ \hline
 & & 6 & 4 & 2 \\
1 & 2 & 8 & 4 & 0 \\
6 & 4 & 2 & 0 & 0 \\ \hline
\end{array}$$

Step 8: Add the partial products.

$$\begin{array}{rrr|r|rl}
 & & 3 & 2 & 1 & \\
 & \times & 2 & 4 & 2 & \\ \cline{1-5}
 & & 6 & 4 & 2 & \text{— partial product} \\
1 & 2 & 8 & 4 & 0 & \text{— partial product} \\
6 & 4 & 2 & 0 & 0 & \text{— partial product} \\ \cline{1-5}
7 & 7 & 6 & 8 & 2 &
\end{array}$$

Concept: **Multiplication With Regrouping**

?

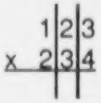
How do you multiply whole numbers with regrouping?

Example: Multiply: 1 2 3 x 2 3 4

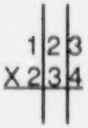
Step 1: Write the problem in vertical form.

$$\begin{array}{r} 123 \\ \underline{\times 234} \end{array}$$

Step 2: Draw grid. (See prior concept.)

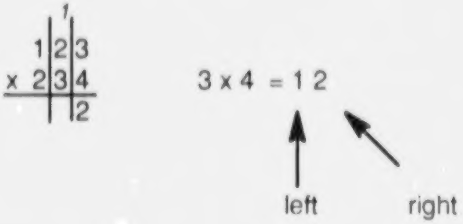


Step 3: Multiply by ones' place. (See prior concept.)



3 X 4 = 12

Step 4: When the partial product is a two-digit number, write the digit on the right in the ones' place and carry the number on the left to the tens' place.



Step 5: Multiply the bottom digit in the ones' place by the top digit in the tens' place. Add the number carried to the partial product. Write the partial product in the tens' place. Cross out carried number.

$$\begin{array}{r|c|l} & & \cancel{1} \\ 1 & 2 & 3 \\ \times\ 2 & 3 & 4 \\ \hline & 9 & 2 \end{array} \qquad \begin{array}{l} 2 \times 4 = 8 \\ 8 + 1 = 9 \end{array}$$

Step 6: Continue as in previous example until product is obtained.

Concept: **Work Real-World Word Problems**

?

What steps do you use to work real-world word problems?

Step 1: Read the problem.

John's average reading rate is 195 words per minute. How many words can he read in 30 minutes?

Step 2: Circle key words and phrases for multiplication.

- **per**
- **average**
- **rate**

John's average reading rate is 195 words per minute. How many words can he read in 30 minutes?

Step 3: Underline the objective statement or question (*what is being asked*).

John's average reading rate is 195 words per minute. How many words can John read in 30 minutes?

Step 4: Determine the operation.

multiplication

Step 5: Write a number sentence. (Draw pictures if needed.)

195 x 30 = ______

Step 6: Compute the answer.

$$\begin{array}{r} 195 \\ \times\ 30 \\ \hline 5850 \end{array}$$

Step 7: Reread and ask: "Is the answer reasonable?"

Round to whole numbers and estimate:

200 x 30 = 6000

Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. *Caution:* your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

The answer is 5,850.

Quiz

Directions: You will be given three minutes to answer correctly as many facts as you can. Do not begin until you are instructed to do so. Write the answer under the problem.

6 x 9	9 x 9	4 x 9	7 x 9	8 x 4	5 x 8	8 x 9	3 x 3
2 x 5	3 x 9	5 x 9	3 x 4	3 x 8	4 x 8	7 x 2	2 x 9
6 x 8	8 x 3	2 x 4	9 x 8	8 x 7	5 x 7	3 x 7	8 x 8
6 x 7	8 x 7	5 x 6	4 x 7	6 x 6	9 x 7	6 x 9	2 x 8
9 x 5	5 x 5	7 x 3	2 x 3	3 x 6	2 x 7	4 x 6	7 x 6
7 x 9	9 x 3	6 x 7	7 x 8	4 x 5	8 x 7	3 x 5	6 x 5
7 x 4	5 x 4	2 x 2	8 x 2	9 x 7	3 x 2	9 x 6	2 x 6
0 x 8	6 x 9	8 x 0	5 x 3	9 x 8	6 x 4	4 x 4	9 x 0
9 x 6	9 x 2	6 x 0	4 x 3	9 x 5	5 x 2	8 x 5	6 x 2
0 x 6	4 x 2	7 x 5	6 x 7	6 x 3	6 x 7	8 x 7	9 x 4

Quiz

Directions: Multiply.

1. $\begin{array}{r} 457 \\ \times\ 83 \\ \hline \end{array}$

2. $\begin{array}{r} 833 \\ \times\ 26 \\ \hline \end{array}$

3. $\begin{array}{r} 726 \\ \times\ 45 \\ \hline \end{array}$

4. $\begin{array}{r} 635 \\ \times\ 82 \\ \hline \end{array}$

5. $\begin{array}{r} 837 \\ \times\ 426 \\ \hline \end{array}$

6. $\begin{array}{r} 903 \\ \times\ 757 \\ \hline \end{array}$

7. $\begin{array}{r} 744 \\ \times\ 883 \\ \hline \end{array}$

8. $\begin{array}{r} 900 \\ \times\ 541 \\ \hline \end{array}$

Vocabulary

Directions: Study the following words and definitions.

factors — the numbers being multiplied

$$\begin{array}{r l} 9 & \leftarrow \text{factor} \\ \underline{\times\ 8} & \leftarrow \text{factor} \\ 72 & \end{array}$$

multiplication — repeated addition; short form of addition

$$\begin{array}{r} 4 \\ +\ 4 \\ \underline{4} \\ 12 \end{array} \qquad 4 \times 3 = 12$$

partial product — product obtained by multiplying a number times part of another number

$$\begin{array}{r l} {}^{4} & \\ 36 & \\ \underline{\times\ 18} & \\ 288 & \leftarrow \text{partial product} \end{array}$$

product — the result of multiplication

$$\begin{array}{r l} 4 & \\ \underline{\times\ 6} & \\ 24 & \leftarrow \text{product} \end{array}$$

Vocabulary

Directions: Label the parts of the following problems. Use **F** for Factor; use **P** for product; and use **PP** for partial product. Put the correct letters in the blanks.

1. $\underset{(a)}{2} \times \underset{(b)}{3} = \underset{(c)}{6}$

2. $$\begin{array}{r l} 4 & (d) \\ \underline{\times\ 5} & (e) \\ 20 & (f) \end{array}$$

3. $\underset{(g)}{547} \times \underset{(h)}{936} = \underset{(i)}{511{,}992}$

4. $$\begin{array}{r l} 931 & (j) \\ \underline{\times 22} & (k) \\ 1862 & (l) \\ \underline{1862} & (m) \\ 20482 & (n) \end{array}$$

a. ______

b. ______

c. ______

d. ______

e. ______

f. ______

g. ______

h. ______

i. ______

j. ______

k. ______

l. ______

m. ______

n. ______

Activity Sheet

☞ **Directions**: Complete the multiplication chart according to the teacher's instructions.

x	0	1	2	3	4	5	6	7	8	9
1	0	1	2	3	4	5	6	7	8	9
2										
3				9						
4										
5										
6	0									
7						35				
8										
9										
10										
11										
12										

Activity Sheet

☞ **Directions:** Multiply.

1. $$\begin{array}{r} 213 \\ \times\ 321 \\ \hline \end{array}$$

2. $$\begin{array}{r} 221 \\ \times\ 422 \\ \hline \end{array}$$

3. $$\begin{array}{r} 332 \\ \times\ 132 \\ \hline \end{array}$$

4. $$\begin{array}{r} 121 \\ \times\ 212 \\ \hline \end{array}$$

5. $$\begin{array}{r} 222 \\ \times\ 333 \\ \hline \end{array}$$

6. $$\begin{array}{r} 212 \\ \times\ 214 \\ \hline \end{array}$$

Activity Sheet

☞ **Directions:** Multiply.

1. $\begin{array}{r} 343 \\ \times\ 221 \\ \hline \end{array}$

2. $\begin{array}{r} 422 \\ \times\ 21 \\ \hline \end{array}$

3. $\begin{array}{r} 202 \\ \times\ 211 \\ \hline \end{array}$

4. $\begin{array}{r} 501 \\ \times\ 22 \\ \hline \end{array}$

5. 611 x 202 = ________

6. 301 x 33 = ________

7. 401 x 111 = ________

8. 205 x 44 = ________

Activity Sheet

☞ **Directions:** Multiply.

1. $\begin{array}{r} 343 \\ \times 321 \\ \hline \end{array}$

2. $\begin{array}{r} 241 \\ \times 624 \\ \hline \end{array}$

3. $\begin{array}{r} 293 \\ \times 372 \\ \hline \end{array}$

4. $\begin{array}{r} 329 \\ \times 221 \\ \hline \end{array}$

5. $\begin{array}{r} 253 \\ \times 231 \\ \hline \end{array}$

6. $\begin{array}{r} 310 \\ \times 408 \\ \hline \end{array}$

7. $\begin{array}{r} 305 \\ \times 215 \\ \hline \end{array}$

8. 251 x 434 = ________

9. 102 x 612 = ________

10. 126 x 612 = ________

Activity Sheet

☞ **Directions:** Multiply.

1. 842 x25	2. 537 x35	3. 982 x15	4. 600 x50
5. 465 x53	6. 601 x51	7. 436 x52	8. 952 x55
9. 872 x500	10. 463 x25	11. 904 x53	12. 603 x55
13. 924 x35	14. 887 x50	15. 728 x15	16. 179 x25
17. 917 x51	18. 568 x55	19. 648 x35	20. 800 x50

Activity Sheet

Directions: Multiply.

1. 645 x78
2. 284 x83
3. 347 x67
4. 904 x58
5. 873 x46
6. 437 x68
7. 948 x87
8. 690 x70
9. 974 x38
10. 406 x273
11. 805 x86
12. 780 x84
13. 18 x70
14. 56 x20
15. 49 x30
16. 28 x40
17. 37 x50
18. 25 x10
19. 497 x18
20. 936 x37

Word Problems

Directions: Use the eight steps below to solve the multiplication word problems.

Step 1. Read the problem.

Step 2. Circle key words and phrases.

product
times
at
per each
total

Step 3. Underline the objective statement or question (what is being asked).

Step 4. Determine the operation.

Step 5. Write a number sentence. (Draw pictures if needed.)

Step 6. Compute the answer.

Step 7. Reread, and ask: "Is the answer reasonable?"

Step 8. If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. *Caution*: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

Activity Sheet

Directions: Use the steps on page 18 and 53 to solve the problems.

1. Carl earns $25 each Saturday by raking yards. How much money can he earn at this rate if he works for 52 Saturdays?

____

2. It costs $1,846 per day to run the linen factory. How much does it cost to run it for two full weeks?

____

3. The owners of a fruit stand sold 128 bushels of apples at $8 per bushel and 75 bushels of okra at $15 per bushel. How much money did they make?

____

4. A truck weighing 5,695 pounds carried a load of 12 cars, each weighing 3,185 pounds. What was the total weight of the cars and the truck?

____

5. Susan works 40 hours per week. She makes $6 per hour. How much will she make in 3 weeks?

____

Section 4

What This Section is About...

In this section you will practice dividing whole numbers. **Whole numbers** are natural numbers or integers such as 0, 1, 2, 3.... You will divide a four- or five-digit number by a two- or three-digit number.

Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Dividing whole numbers 2. Working real-world word problems	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Dividing Whole Numbers**

?

How do you divide whole numbers?

Example: 46,298 ÷ 37

Step 1: Rewrite the problem.

$$37\,\overline{)\,46{,}298}$$

Step 2: Round the divisor to the nearest ten.

$$37\,\overline{)\,46{,}\,298} \qquad 40\,\overline{)\,46{,}\,298}$$

37 rounds to 40

Step 3: Estimate how many times the divisor (37) will go into the first two digits of the dividend (46). The estimate has to be between 0 and 9. (If the estimate is 0, start over and guess how many times the divisor will go into the first three digits of the dividend.)

$$37\,\overline{)\,46{,}\,298} \qquad 40\,\overline{)\,46{,}\,298}$$

40 will go into 46 one time

Step 4: Write the estimate (1) over the "6" of 46. Multiply: 37 X 1. Write the answer underneath the 46, then subtract. If the estimate is too large, you won't be able to subtract and should try a smaller number.

$$\begin{array}{rl} & 1 \\ 37 & \overline{)\,4\,6\,2\,9\,8} \\ & \underline{-\,3\,7} \\ & 9 \end{array}$$

After subtracting, make sure that the answer (9) is less than the divisor (37). If not, the estimate was too small and a larger number should be tried.

Step 5: Bring the next digit in the dividend down.

$$\begin{array}{r} 1 \\ 37\,\overline{)\,46298} \\ -\underline{37} \\ 92 \end{array}$$

Step 6: Repeat the process. Estimate how many times 37 will go into 92 (or 40 into 90). Multiply that estimate (2) times 37. Write the answer underneath the 92, then subtract.

$$\begin{array}{r} 12 \\ 37\,\overline{)\,46298} \\ -\underline{37} \\ 92 \\ -\underline{74} \\ 18 \end{array}$$

Step 7: Continue, repeating the process, until all the digits in the dividend have been brought down.

$$\begin{array}{r} 1251 \\ 37\,\overline{)\,46298} \\ -\underline{37} \\ 92 \\ -\underline{74} \\ 189 \\ -\underline{185} \\ 48 \\ -\underline{37} \\ 11 \end{array}$$

Step 8: The remainder may be written one of two ways.

1251 Remainder 11 or $1251 \frac{11}{37}$

To put the remainder in fractional form, write the number remaining after the last subtraction (11) over the divisor (37) or $\frac{11}{37}$.

Concept **Working Real-World Word Problems**

?

What steps do you use to work real-world word problems?

Step 1: Read the problem.

Mrs. Murphy earns an annual salary of $18,468.
How much does she earn each month?

Step 2: Circle key words.

- **annual**
- **month**
- **each**

Mrs. Murphy earns an **annual** salary of $18,468.
How much does Mrs. Murphy earn **each month**?

Step 3: Underline the question or what is being asked.

Mrs. Murphy earns an annual salary of $18,468.
<u>How much does Mrs. Murphy earn each month?</u>

Step 4: Determine the operation.

This problem requires division.

Step 5: Write a number sentence. (Draw pictures if needed.)

18,468 ÷ 12

Step 6: Compute the answer.

```
       1 539
12 ) 18,468
     12
      64
      60
       46
       36
       108
       108
         0
```

Step 7: Reread and ask: "Is the answer reasonable?"

Round to whole numbers and estimate:

20,000 ÷ 10 = 2000

Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. *Caution:* your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

The answer is 1,539 each month.

Quiz

Directions: Round the following numbers to the nearest ten. Write each rounded number on the line.

1. 83 = ________
2. 65 = ________
3. 23 = ________
4. 59 = ________
5. 78 = ________
6. 32 = ________
7. 76 = ________
8. 85 = ________
9. 93 = ________
10. 35 = ________

Directions: Subtract.

11. $\begin{array}{r} 789 \\ -191 \\ \hline \end{array}$

12. $\begin{array}{r} 5434 \\ -675 \\ \hline \end{array}$

Quiz

Directions: Subtract.

1. $\begin{array}{r} 78{,}567 \\ -40{,}529 \\ \hline \end{array}$

2. $\begin{array}{r} 4567 \\ -1418 \\ \hline \end{array}$

3. $\begin{array}{r} 51{,}678 \\ -10{,}297 \\ \hline \end{array}$

4. $\begin{array}{r} 4713 \\ -2192 \\ \hline \end{array}$

Directions: Multiply.

5. $\begin{array}{r} 43 \\ \times 2 \\ \hline \end{array}$

6. $\begin{array}{r} 39 \\ \times 4 \\ \hline \end{array}$

7. $\begin{array}{r} 43 \\ \times 12 \\ \hline \end{array}$

8. $\begin{array}{r} 583 \\ \times 27 \\ \hline \end{array}$

Quiz

Directions: Divide.

1. $25\overline{)75}$

2. $25\overline{)7500}$

3. $19\overline{)42{,}560}$

4. $30\overline{)4033}$

5. $66\overline{)73{,}326}$

6. $50\overline{)21{,}400}$

7. $18\overline{)96{,}974}$

8. $14\overline{)32{,}754}$

9. $27\overline{)1224}$

10. $24\overline{)27{,}648}$

Vocabulary

Directions: Study the vocabulary words below.

divide — to separate into two or more parts

dividend — the number to be divided

$$\begin{array}{r} 6 \\ 6\enclose{longdiv}{\enclose{circle}{36}} \end{array}$$

divisor — the number by which you divide

$$\begin{array}{r} 6 \\ \enclose{circle}{6}\enclose{longdiv}{36} \end{array}$$

quotient — the result of division

$$\begin{array}{r} \enclose{circle}{6} \\ 6\enclose{longdiv}{36} \end{array}$$

remainder — the number (amount) left when the division is not exact

$$\begin{array}{rl} 5 & \enclose{circle}{R5} \\ 6\enclose{longdiv}{35} & \\ \underline{-\,30} & \\ 5 & \end{array}$$

symbols for division — ÷ and $\enclose{longdiv}{\qquad}$ and $\frac{12}{4} \longleftarrow$

Vocabulary Activity

Directions: Label the parts of the following problems. Use **D** for Divisor, **Q** for Quotient, **R** for Remainder, **DV** for Dividend. Write the correct letters in the blanks.

1. $\underset{\text{(a)}}{6} \div \underset{\text{(b)}}{2} = \underset{\text{(c)}}{3}$

2. $\underset{\text{(d)}}{16} \div \underset{\text{(e)}}{4} = \underset{\text{(f)}}{4}$

3. $\text{(g)} \quad \begin{array}{r} 4 \\ 2\,\overline{)\,8} \end{array} \quad \begin{array}{l} \text{(h)} \\ \text{(i)} \end{array}$

4. $\begin{array}{l} \text{(j)} \\ \text{(k)} \end{array} \; \frac{251}{5} = \overset{\text{(l)}}{50} \, \frac{1}{5} \; \begin{array}{l} \text{(m)} \\ \text{(n)} \end{array}$

a. ________

b. ________

c. ________

d. ________

e. ________

f. ________

g. ________

h. ________

i. ________

j. ________

k. ________

l. ________

m. ________

n. ________

Activity Sheet

☞ **Directions:** Divide.

1. $31\overline{)72}$

2. $20\overline{)620}$

3. $32\overline{)4046}$

4. $43\overline{)43,876}$

5. $25\overline{)54}$

6. $50\overline{)540}$

7. $30\overline{)5400}$

8. $70\overline{)59,070}$

9. $24\overline{)87}$

10. $23\overline{)184}$

Activity Sheet

☞ **Directions:** Divide.

1. $21\overline{)1491}$

2. $38\overline{)21,584}$

3. $5\overline{)94}$

4. $24\overline{)369}$

5. $25\overline{)6000}$

6. $13\overline{)91}$

7. $10\overline{)3757}$

8. $50\overline{)5772}$

9. $82\overline{)11,730}$

10. $60\overline{)10,420}$

Activity Sheet

Directions: Divide.

1. $43\overline{)26{,}856}$

2. $71\overline{)42{,}849}$

3. $27\overline{)22{,}833}$

4. $35\overline{)25{,}011}$

5. $84\overline{)58{,}520}$

6. $68\overline{)56{,}084}$

7. $56\overline{)16{,}716}$

8. $92\overline{)32{,}640}$

9. $17\overline{)15{,}329}$

10. $51\overline{)19{,}202}$

Activity Sheet

Directions: Divide.

1. 45,120 ÷ 47 = ______

2. 12, 420 ÷ 18 = ______

3. 16, 016 ÷ 52 = ______

4. 86,700 ÷ 67 = ______

5. $46\overline{)1000}$

6. $59\overline{)6075}$

7. $29\overline{)74{,}704}$

8. $47\overline{)97{,}932}$

9. $15\overline{)48{,}165}$

10. $31\overline{)94{,}843}$

Activity Sheet

Directions: Divide.

1. $37\overline{)154}$
2. $45\overline{)4158}$
3. $25\overline{)9201}$
4. $54\overline{)548}$
5. $28\overline{)73}$
6. $36\overline{)4357}$
7. $42\overline{)1890}$
8. $65\overline{)3844}$
9. $15\overline{)2182}$
10. $32\overline{)4640}$
11. $42\overline{)2491}$
12. $90\overline{)7812}$

Word Problems

☞ **Directions:** Use the steps below to solve the division word problems.

Step 1. Read the problem.

Step 2. Circle key words and phrases for division.

quotient
divided by
cost per inch
share
how many... each
average

Step 3. Underline the objective statement or question (what is being asked).

Step 4. Determine the operation.

Step 5. Write a number sentence. (Draw pictures if needed.)

Step 6. Compute the answer.

Step 7. Reread, and ask: "Is the answer reasonable?"

Step 8. If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. *Caution*: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

Word Problems

☞ **Directions:** Use multiplication or division to solve. Follow the steps on page 71.

1. Mr. Simpson had 38 pupils in his class. He gave each pupil six sheets of paper. How many sheets of paper did he use?

   ____

2. If four baseballs are put in each box, how many boxes are needed to package 273 baseballs? How many baseballs would be left?

   ____

3. There are 19 builders working for a construction company. Each worked 47 hours last week. What is the total number of hours they worked last week?

   ____

4. Pat's mother bought a video machine for $285.00. If she paid $45.00 down and arranged to pay off the balance in eight equal payments, what was the amount of each payment?

   ____

5. Miss March earns an annual salary of $14,853. What is her monthly salary? (Round to hundreds.)

   ____

6. How far can a car travel if it averages 24 miles per gallon and the tank holds 19 gallons?

   ____

7. There are 365 days in a year except leap year which has 366 days. How many days are there in three years, if there is no leap year included?

   ____

UNIT 2: FRACTIONS

Section 1: Addition
Section 2: Subtraction
Section 3: Multiplication
Section 4: Division

Section 1

What This Section is About...

In this section you will practice addition of fractions. The operations of simplifying, finding common denominators, finding equivalent fractions, and the renaming as mixed numbers are included to enable you to add like and unlike fractions. Sums include both proper and improper fractions.

Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Simplifying fractions 2. Adding like fractions 3. Finding common denominators 4. Adding fractions with unlike denominators 5. Renaming improper fractions as mixed numbers 6. Adding fractions with unlike denominators whose sum is an improper fraction	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Simplifying Fractions**

?

How do you simplify fractions?

Example: Rename $\frac{6}{8}$ in simplest form.

Step 1: Determine *all* the factors of the numerator (6) by numbering from 1 to 6 and circling the numbers that are factors. A factor is a number that will divide into the number evenly with no remainder.

6 → ① ② ③ 4 5 ⑥

The circled numbers are factors of 6.

Step 2: Determine all the factors of the denominator (8) using the same method.

8 → ① ② 3 ④ 5 6 7 ⑧

Step 3: Compare the two rows of numbers and find the largest factor that is circled in both rows.

6 → ① ② ③ 4 5 ⑥

8 → ① ② 3 ④ 5 6 7 ⑧

Two (2) is the largest factor that is circled in both rows.

Step 4: Go back to the original fraction $\frac{6}{8}$.

Divide both the numerator and denominator by the greatest common factor (2).

Solution:

$$\frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

Concept: **Adding Like Fractions**

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How do you add like fractions?

Example: Add and rename in simplest form. $25\frac{2}{10} + 16\frac{3}{10}$

Step 1: Rewrite in vertical form.

$$\begin{array}{r} 25\frac{2}{10} \\ +\ 16\frac{3}{10} \\ \hline \end{array}$$

Step 2: Add the fractions by adding the numerators; write the new numerator over the denominator.

$$\begin{array}{r} 25\frac{2}{10} \\ +\ 16\frac{3}{10} \\ \hline \frac{5}{10} \end{array}$$

Step 3: Add the whole numbers.

$$\begin{array}{r} 25\frac{2}{10} \\ +\ 16\frac{3}{10} \\ \hline 41\frac{5}{10} \end{array}$$

Step 4: Reduce the fraction, if necessary.

$$\begin{array}{r} 25\,\frac{2}{10} \\ +\,16\,\frac{3}{10} \\ \hline 41\,\frac{5}{10} \end{array} = 41\,\frac{1}{2}$$

Concept: Finding Common Denominators

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What steps do you use to find a common denominator?

Example 1: Find a common denominator for

$$\frac{2}{3} \text{ and } \frac{5}{6}$$

Step 1: Check to see if the smaller denominator (3) is a factor of the larger denominator (6) by dividing 6 by 3. If it is, the larger denominator is the common denominator.

$\frac{2}{\mathbf{3}}$ and $\frac{5}{\mathbf{6}}$ yes, 6 is divisible by 3, so 6 is a common denominator

Step 2: Multiply *both* the numerator and the denominator of $\frac{2}{3}$ by 2.

$$\frac{2 \times 2}{3 \times 2} = \frac{4}{6}$$

Solution: $\frac{2}{3} = \frac{3}{6}$

$\frac{5}{6} = \frac{5}{6}$

Example 2: Find a common denominator for $\frac{3}{5}$ and $\frac{5}{8}$.

Step 1: Check to see if the smaller denominator (5) is a factor of the larger denominator (8). No, 5 cannot be multiplied by any whole number to become 8, so 8 will not be a common denominator.

Step 2: Multiply the numerator and the denominator of $\frac{3}{5}$ by the denominator of $\frac{5}{8}$

$$\frac{3 \times 8}{5 \times 8} = \frac{24}{40}$$

Step 3: Multiply the numerator and denominator $\frac{5}{8}$ by the denominator of $\frac{3}{5}$

$$\frac{5 \times 5}{8 \times 5} = \frac{25}{40}$$

Solution: $\frac{3}{5} = \frac{24}{40}$ $\frac{5}{8} = \frac{25}{40}$

Note: It is not necessary for accurate computation to use the *least* common denominator; however, it makes reducing easier.

Concept: **Adding Fractions with Unlike Denominators**

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What steps do you use to add fractions with unlike denominators?

Example: Add $\frac{1}{4} + \frac{1}{2}$

Step 1: Rewrite vertically.

$$\begin{array}{r} \frac{1}{4} \\ + \frac{1}{2} \\ \hline \end{array}$$

Step 2: Find the least common denominator. The least common denominator of $\frac{1}{2}$ and $\frac{4}{4}$ is 4.

Step 3: Rename the equivalent fractions as needed with the least common denominator.

$$\frac{1}{2} = \frac{2}{4}$$

Step 4: Add the numerators and place the results over the common denominator. Simplify, if needed.

$$\begin{array}{rcr} \frac{1}{4} & = & \frac{1}{4} \\ +\frac{1}{2} & = & \frac{2}{4} \\ \hline & & \frac{3}{4} \end{array}$$

Concept: **Renaming Improper Fractions as Mixed Numbers**

?

What steps do you use to rename an improper fraction as a mixed number?

Example: $\frac{11}{5}$ is the same as what mixed number?

Step 1: Write the improper fraction as a division problem by writing the denominator (5) as the divisor and the numerator (11) as the dividend.

$$\frac{11}{5} \rightarrow 5\overline{)\,11}$$

Step 2: Divide. Put the remainder over the divisor to form a fraction.

$$\begin{array}{r} 2\,\frac{1}{5} \\ 5\overline{)\,11} \\ -10 \\ \hline 1 \end{array}$$

Step 3: Check to make sure the denominator of the improper fraction is the same as the denominator of the mixed number.

$$\frac{11}{\enclose{circle}{5}} = 2\,\frac{1}{\enclose{circle}{5}}$$

Solution: $\frac{11}{5} = 2\,\frac{1}{5}$

Concept: **Adding Fractions with Unlike Denominators Whose Sum is an Improper Fraction**

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What steps do you use to add fractions with unlike denominators whose sum is an improper fraction?

Example: Add and rename in simplest form.

$$\begin{array}{r} 30\frac{4}{5} \\ +\ 15\frac{7}{10} \\ \hline \end{array}$$

Step 1: Change the fractions to equivalent fractions with common denominators.

$$\begin{array}{rcr} 30\frac{4}{5} & = & 30\frac{8}{10} \\ +\ 15\frac{7}{10} & = & 15\frac{7}{10} \\ \hline \end{array}$$

Step 2: Add the fractions.

$$\begin{array}{rcr} 30\frac{4}{5} & = & 30\frac{8}{10} \\ +\ 15\frac{7}{10} & = & 15\frac{7}{10} \\ \hline & & \frac{15}{10} \end{array}$$

Step 3: Add the whole numbers.

$$\begin{array}{rcr} 30\frac{4}{5} & = & 30\frac{8}{10} \\ +\ 15\frac{7}{10} & = & 15\frac{7}{10} \\ \hline & & 45\frac{15}{10} \end{array}$$

Step 4: Write the improper fraction $\frac{15}{10}$ as a mixed number and reduce:

$$\frac{15}{10} = 1\frac{5}{10} = 1\frac{1}{2}$$

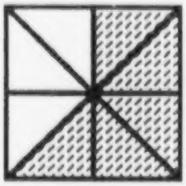
Step 5: Add the resulting mixed number ($1\frac{1}{2}$) to the whole number (45):

$$\begin{array}{r} 45 \\ +\,1\frac{1}{2} \\ \hline 46\frac{1}{2} \end{array}$$

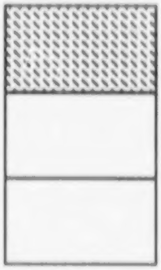
Solution: $46\frac{1}{2}$

Quiz

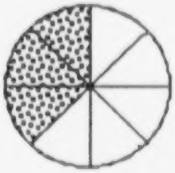
Directions: Write a fraction for the shaded area of each picture.



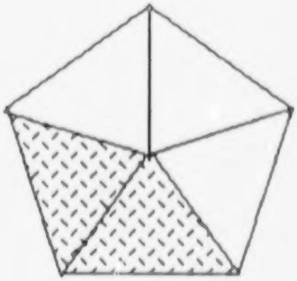
1. ____________



2. ____________



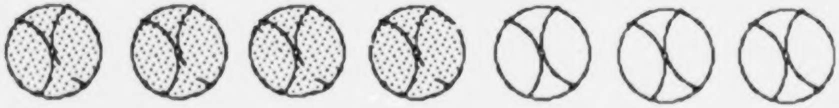
3. ____________



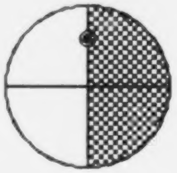
4. ____________

Quiz

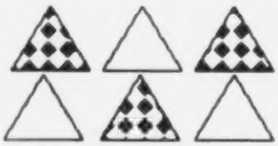
Directions: Write a fraction for the shaded part of each picture.



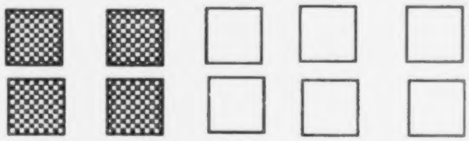
5. ____________



6. ____________



7. ____________



8. ____________

Quiz

Directions: Simplify the fractions.

1. $\frac{8}{3} =$ ______
2. $\frac{47}{5} =$ ______
3. $\frac{3}{9} =$ ______
4. $\frac{4}{8} =$ ______
5. $\frac{16}{2} =$ ______
6. $\frac{6}{8} =$ ______

Directions: Add and simplify.

1. $\frac{3}{7} + \frac{1}{7} =$ ______
2. $\frac{5}{8} + \frac{1}{8} =$ ______
3. $\frac{2}{3} + \frac{4}{6} =$ ______
4. $\frac{4}{5} + \frac{1}{10} =$ ______
5. $1\frac{1}{4} + 2\frac{2}{4} =$ ______
6. $6\frac{2}{3} + 5\frac{5}{6} =$ ______

Vocabulary

Directions: Study the following words.

common factor — one number that is a factor for two different given numbers is a common factor of those two numbers

denominator — (bottom number), indicates the number of even parts that the whole is divided into

Example: $\frac{1}{2} \leftarrow$

factor (verb) — to find factors of a given number, to *break down* into factors

factors (noun) — numbers that are multiplied

fraction — a part of the whole when the whole is divided into even portions (parts)

Examples: $\frac{1}{2}$; $\frac{3}{4}$

greatest common factor (GCF) — greatest number that is a factor for two on more numbers

improper fraction — the numerator (top number) is larger or the same as the denominator(bottom number); a fraction whose value is greater than or equal to one

Example: $\frac{8}{4}$

least common denominator (LCD) — the least common multiple of two given denominators; used when adding or subtracting fractions

lowest term — numerator (top number) is smaller than the denominator (bottom number) and there is not a number that will divide into both the top and the bottom

Example: $\frac{4}{8} = \frac{1}{2}$ lowest terms

Vocabulary

☞ **Directions**: Study the following words.

like fractions — two or more fractions which have common denominators

mixed number — a combination of a whole number and a fraction

Example: $1\frac{3}{4}$

multiple(s)— the product of a given number by another

Example: 35 is a multiple of 7; the multiples of 6 are 0, 6, 12, 18, 24, and so on.

numerator — (top number), represents the number of even parts out of the denominator that are being counted

Example: $\frac{1}{2} \longleftarrow$

proper fraction — the numerator (top number) is smaller than the denominator (bottom number)

Example: $\frac{4}{8}$

simplify — to write in lowest terms; reduce

Example: $\frac{3}{6} = \frac{1}{2}$

unlike fractions — two or more fractions which do not have common denominators

Vocabulary

Directions: Use the vocabulary list to identify the following expressions. Write the correct word in each blank.

1. The 3 in $\frac{2}{3}$ is the ______

2. The 2 in $\frac{2}{3}$ is the ______

3. $\frac{7}{5}$ is a(n) ____________

4. $3\frac{1}{5}$ is a(n) ____________

5. $\frac{3}{8}$ is in ____________

6. $\frac{1}{3}$ is a(n) ____________

7. When $\frac{5}{3}$ is renamed as $1\frac{2}{3}$ it is ____________

8. Renaming $\frac{10}{4}$ as $2\frac{2}{4}$ as $2\frac{1}{2}$ is called ____________

Activity Sheet

Directions: Rename in simplest form by finding the greatest common factor. Underline *all* the factors of each numeral. Then, circle the GCF for each problem.

1.	6	1	2	3	4	5	6						
	8	1	2	3	4	5	6	7	8				
2.	4	1	2	3	4								
	6	1	2	3	4	5	6						
3.	3	1	2	3									
	9	1	2	3	4	5	6	7	8	9			
4.	9	1	2	3	4	5	6	7	8	9			
	12	1	2	3	4	5	6	7	8	9	10	11	12
5.	5	1	2	3	4	5							
	10	1	2	3	4	5	6	7	8	9	10		

Activity Sheet

☞ **Directions:** Circle the fraction in each row that is in simplest form.

1. a) $\frac{2}{6}$ b) $\frac{3}{6}$ c) $\frac{2}{3}$ d) $\frac{6}{8}$

2. a) $\frac{4}{5}$ b) $\frac{3}{9}$ c) $\frac{4}{12}$ d) $\frac{2}{4}$

3. a) $\frac{8}{10}$ b) $\frac{5}{9}$ c) $\frac{10}{12}$ d) $\frac{6}{9}$

4. a) $\frac{2}{9}$ b) $\frac{12}{24}$ c) $\frac{4}{8}$ d) $\frac{12}{15}$

5. a) $\frac{3}{12}$ b) $\frac{5}{10}$ c) $\frac{2}{4}$ d) $\frac{9}{10}$

Activity Sheet

Directions: Reduce to lowest terms. (Simplify.)

1. $\frac{8}{10}$ = ______

2. $\frac{3}{9}$ = ______

3. $\frac{4}{8}$ = ______

4. $\frac{6}{9}$ = ______

5. $\frac{2}{12}$ = ______

6. $\frac{5}{15}$ = ______

7. $\frac{6}{21}$ = ______

8. $\frac{4}{6}$ = ______

9. $\frac{7}{14}$ = ______

10. $\frac{10}{18}$ = ______

11. $\frac{8}{4}$ = ______

12. $\frac{10}{10}$ = ______

Activity Sheet

Directions: Add the following fractions.

1. $\frac{3}{5} + \frac{1}{5} =$ __________

2. $\frac{4}{8} + \frac{3}{8} =$ __________

3. $\frac{1}{7} + \frac{3}{7} =$ __________

4. $\frac{5}{11} + \frac{4}{11} =$ __________

5. $\frac{2}{15} + \frac{2}{15} + \frac{7}{15} =$ __________

6. $\frac{2}{12} + \frac{9}{12} =$ __________

7.
$$\begin{array}{r} \frac{4}{10} \\ + \frac{5}{10} \\ \hline \end{array}$$

8.
$$\begin{array}{r} \frac{4}{13} \\ \frac{6}{13} \\ + \frac{1}{13} \\ \hline \end{array}$$

9.
$$\begin{array}{r} \frac{1}{5} \\ \frac{1}{5} \\ + \frac{1}{5} \\ \hline \end{array}$$

10.
$$\begin{array}{r} \frac{3}{8} \\ + \frac{4}{8} \\ \hline \end{array}$$

Activity Sheet

☞ **Directions:** Add. Rename in simplest form when necessary.

1. $$\begin{array}{r} 16\frac{2}{5} \\ +\,24\frac{1}{5} \\ \hline \end{array}$$

2. $$\begin{array}{r} 34\frac{3}{8} \\ +\,25\frac{4}{8} \\ \hline \end{array}$$

3. $$\begin{array}{r} 53\frac{1}{3} \\ +\,12\frac{1}{3} \\ \hline \end{array}$$

4. $$\begin{array}{r} 17\frac{3}{10} \\ +\,64\frac{1}{10} \\ \hline \end{array}$$

5. $$\begin{array}{r} 27\frac{1}{6} \\ +\,34\frac{1}{6} \\ \hline \end{array}$$

6. $$\begin{array}{r} 93\frac{1}{8} \\ +\,21\frac{1}{8} \\ \hline \end{array}$$

7. $$\begin{array}{r} 35\frac{3}{5} \\ +\,42\frac{1}{5} \\ \hline \end{array}$$

8. $$\begin{array}{r} 23\frac{1}{4} \\ +\,65\frac{1}{4} \\ \hline \end{array}$$

9. $$\begin{array}{r} 21\frac{3}{8} \\ +\,56\frac{3}{8} \\ \hline \end{array}$$

10. $$\begin{array}{r} 36\frac{1}{5} \\ +\,49\frac{2}{5} \\ \hline \end{array}$$

11. $$\begin{array}{r} 14\frac{3}{4} \\ +\,12\frac{1}{4} \\ \hline \end{array}$$

12. $$\begin{array}{r} 21\frac{4}{5} \\ +\,10\frac{3}{5} \\ \hline \end{array}$$

Activity Sheet

Directions: Find the least common denominator and rename each pair of fractions.

1. $\frac{1}{3}$ = ____________
   $\frac{1}{6}$ = ____________

2. $\frac{2}{5}$ = ____________
   $\frac{1}{10}$ = ____________

3. $\frac{3}{7}$ = ____________
   $\frac{5}{14}$ = ____________

4. $\frac{7}{9}$ = ____________
   $\frac{7}{18}$ = ____________

5. $\frac{5}{12}$ = ____________
   $\frac{3}{4}$ = ____________

6. $\frac{3}{16}$ = ____________
   $\frac{1}{4}$ = ____________

7. $\frac{2}{3}$ = ____________
   $\frac{5}{24}$ = ____________

8. $\frac{4}{5}$ = ____________
   $\frac{9}{20}$ = ____________

9. $\frac{7}{9}$ = ____________
   $\frac{4}{27}$ = ____________

10. $\frac{4}{15}$ = ____________
    $\frac{1}{3}$ = ____________

Activity Sheet

☞ **Directions**: Find the least common denominator and rename each pair of fractions.

1. $\frac{2}{5}$ = ____________
   $\frac{2}{3}$ = ____________

2. $\frac{1}{9}$ = ____________
   $\frac{3}{7}$ = ____________

3. $\frac{1}{4}$ = ____________
   $\frac{2}{5}$ = ____________

4. $\frac{3}{8}$ = ____________
   $\frac{2}{9}$ = ____________

5. $\frac{5}{6}$ = ____________
   $\frac{4}{7}$ = ____________

6. $\frac{1}{2}$ = ____________
   $\frac{4}{9}$ = ____________

7. $\frac{2}{15}$ = ____________
   $\frac{1}{8}$ = ____________

8. $\frac{5}{12}$ = ____________
   $\frac{1}{7}$ = ____________

9. $\frac{5}{13}$ = ____________
   $\frac{5}{6}$ = ____________

10. $\frac{3}{11}$ = ____________
    $\frac{7}{10}$ = ____________

Activity Sheet

Directions: Add. Simplify if necessary.

1. $\frac{2}{3} + \frac{1}{4}$
2. $\frac{1}{2} + \frac{1}{4}$
3. $\frac{1}{3} + \frac{3}{6}$
4. $\frac{1}{4} + \frac{5}{8}$
5. $\frac{3}{4} + \frac{1}{6}$
6. $\frac{3}{5} + \frac{1}{10}$
7. $\frac{1}{4} + \frac{2}{5}$
8. $\frac{3}{10} + \frac{2}{5}$
9. $\frac{1}{8} + \frac{2}{10}$
10. $\frac{3}{8} + \frac{3}{2}$
11. $\frac{1}{10} + \frac{2}{5}$
12. $\frac{3}{9} + \frac{1}{4}$

Activity Sheet

Directions: Add.

1. $\frac{1}{2} + \frac{3}{5} =$ ____________

2. $\frac{3}{4} + \frac{1}{2} =$ ____________

3. $\frac{7}{10} + \frac{7}{8} =$ ____________

4. $\frac{1}{2} + \frac{2}{5} =$ ____________

5. $\frac{1}{3} + \frac{3}{4} =$ ____________

6. $\frac{5}{6} + \frac{1}{5} =$ ____________

7. $\frac{1}{2} + \frac{2}{3} =$ ____________

8. $\frac{3}{10} + \frac{1}{3} =$ ____________

9. $\frac{7}{8} + \frac{1}{3} =$ ____________

10. $\frac{2}{5} + \frac{3}{4} =$ ____________

Activity Sheet

Directions: Add and rename in simplest form.

1. $\begin{array}{r} 16\frac{1}{2} \\ +\ 13\frac{1}{4} \\ \hline \end{array}$

2. $\begin{array}{r} 23\frac{1}{3} \\ +\ 47\frac{2}{5} \\ \hline \end{array}$

3. $\begin{array}{r} 51\frac{1}{4} \\ +\ 13\frac{3}{8} \\ \hline \end{array}$

4. $\begin{array}{r} 16\frac{2}{5} \\ +\ 47\frac{3}{10} \\ \hline \end{array}$

5. $\begin{array}{r} 31\frac{3}{8} \\ +\ 42\frac{1}{6} \\ \hline \end{array}$

6. $\begin{array}{r} 54\frac{1}{2} \\ +\ 27\frac{1}{5} \\ \hline \end{array}$

7. $\begin{array}{r} 34\frac{1}{6} \\ +\ 51\frac{3}{4} \\ \hline \end{array}$

8. $\begin{array}{r} 61\frac{3}{8} \\ +\ 43\frac{1}{10} \\ \hline \end{array}$

9. $\begin{array}{r} 38\frac{2}{5} \\ +\ 44\frac{1}{4} \\ \hline \end{array}$

10. $\begin{array}{r} 87\frac{1}{6} \\ +\ 36\frac{1}{3} \\ \hline \end{array}$

11. $\begin{array}{r} 42\frac{3}{5} \\ +\ 32\frac{1}{3} \\ \hline \end{array}$

12. $\begin{array}{r} 21\frac{1}{4} \\ +\ 13\frac{1}{3} \\ \hline \end{array}$

Activity Sheet

Directions: Rename the following improper fractions as mixed numbers.

1. $\frac{7}{2} =$

think $2\overline{)\,7}$

2. $\frac{8}{3} =$

think $3\overline{)\,8}$

3. $\frac{11}{6} =$

4. $\frac{12}{5} =$

5. $\frac{15}{8} =$

6. $\frac{33}{10} =$

7. $\frac{71}{25} =$

8. $\frac{15}{4} =$

9. $\frac{171}{50} =$

10. $\frac{73}{20} =$

Activity Sheet

Directions: Simplify. Hint: The answer will be a mixed numeral.

1. $\frac{25}{4} =$ ____________

2. $\frac{13}{12} =$ ____________

3. $\frac{25}{7} =$ ____________

4. $\frac{19}{9} =$ ____________

5. $\frac{27}{5} =$ ____________

6. $\frac{576}{31} =$ ____________

7. $\frac{29}{5} =$ ____________

8. $\frac{30}{14} =$ ____________

9. $\frac{273}{20} =$ ____________

10. $\frac{209}{15} =$ ____________

Activity Sheet

☞ **Directions**: Add. Simplify if necessary.

1. $\frac{3}{7} + \frac{1}{7} =$ ______

2. $\frac{4}{9} + \frac{2}{9} =$ ______

3. $\frac{2}{3} + \frac{1}{3} =$ ______

4. $\frac{5}{12} + \frac{7}{12} =$ ______

5. $\frac{1}{5} + \frac{2}{5} =$ ______

6. $\frac{4}{7} + \frac{2}{7} =$ ______

7. $\frac{3}{8} + \frac{5}{8} =$ ______

8. $\frac{3}{4} + \frac{1}{4} =$ ______

9. $\frac{4}{15} + \frac{14}{15} =$ ______

10. $\frac{8}{21} + \frac{19}{21} =$ ______

Activity Sheet

Directions: Add. Reduce to lowest terms.

1. $\frac{2}{3} + \frac{3}{4}$

2. $\frac{1}{2} + \frac{2}{4}$

3. $\frac{5}{6} + \frac{5}{12}$

4. $\frac{1}{8} + \frac{7}{12}$

5. $\frac{3}{4} + \frac{5}{6}$

6. $\frac{3}{5} + \frac{7}{8}$

7. $\frac{11}{15} + \frac{4}{5}$

8. $\frac{7}{10} + \frac{11}{16}$

9. $\frac{1}{8} + \frac{7}{12} =$ ______

10. $\frac{3}{8} + \frac{3}{2} =$ ______

11. $\frac{2}{3} + \frac{3}{5} =$ ______

12. $\frac{5}{8} = \frac{2}{12} =$ ______

Activity Sheet

Directions: Add, and rename in simplest form.

1. $\begin{array}{r} 16\frac{2}{3} \\ +\ 46\frac{1}{3} \\ \hline \end{array}$

2. $\begin{array}{r} 43\frac{3}{5} \\ +\ 58\frac{4}{5} \\ \hline \end{array}$

3. $\begin{array}{r} 28\frac{5}{6} \\ +\ 65\frac{1}{6} \\ \hline \end{array}$

4. $\begin{array}{r} 42\frac{3}{8} \\ +\ 13\frac{7}{8} \\ \hline \end{array}$

5. $\begin{array}{r} 21\frac{7}{10} \\ +\ 18\frac{9}{10} \\ \hline \end{array}$

6. $\begin{array}{r} 25\frac{1}{2} \\ +\ 36\frac{1}{2} \\ \hline \end{array}$

7. $\begin{array}{r} 94\frac{5}{6} \\ +\ 36\frac{5}{6} \\ \hline \end{array}$

8. $\begin{array}{r} 74\frac{7}{8} \\ +\ 38\frac{5}{8} \\ \hline \end{array}$

9. $\begin{array}{r} 64\frac{9}{10} \\ +\ 53\frac{3}{10} \\ \hline \end{array}$

10. $\begin{array}{r} 21\frac{4}{5} \\ +\ 46\frac{4}{5} \\ \hline \end{array}$

11. $\begin{array}{r} 50\frac{6}{7} \\ +\ 25\frac{3}{7} \\ \hline \end{array}$

12. $\begin{array}{r} 44\frac{3}{4} \\ +\ 21\frac{1}{4} \\ \hline \end{array}$

Activity Sheet

Directions: Add, and rename in simplest form.

1. $\begin{array}{r} 16\frac{2}{3} \\ +\ 41\frac{7}{8} \\ \hline \end{array}$

2. $\begin{array}{r} 57\frac{5}{6} \\ +\ 86\frac{2}{3} \\ \hline \end{array}$

3. $\begin{array}{r} 25\frac{1}{2} \\ +\ 32\frac{3}{4} \\ \hline \end{array}$

4. $\begin{array}{r} 63\frac{7}{10} \\ +\ 41\frac{7}{8} \\ \hline \end{array}$

5. $\begin{array}{r} 27\frac{2}{3} \\ +\ 13\frac{3}{4} \\ \hline \end{array}$

6. $\begin{array}{r} 53\frac{3}{5} \\ +\ 12\frac{7}{10} \\ \hline \end{array}$

7. $\begin{array}{r} 18\frac{5}{6} \\ +\ 36\frac{3}{8} \\ \hline \end{array}$

8. $\begin{array}{r} 81\frac{5}{6} \\ +\ 13\frac{1}{5} \\ \hline \end{array}$

9. $\begin{array}{r} 21\frac{1}{2} \\ +\ 48\frac{5}{6} \\ \hline \end{array}$

10. $\begin{array}{r} 15\frac{3}{4} \\ +\ 75\frac{3}{8} \\ \hline \end{array}$

11. $\begin{array}{r} 23\frac{3}{4} \\ +\ 19\frac{1}{8} \\ \hline \end{array}$

12. $\begin{array}{r} 14\frac{2}{3} \\ +\ 13\frac{1}{6} \\ \hline \end{array}$

Word Problems

Directions: Use the steps on page 18 to solve the word problems. Reduce when possible.

1. Pete worked 2 1/5 hours on Monday and 3 1/2 hours on Tuesday. How many hours did he work in all?

   ____

2. Rickey baked 1 1/4 dozen cookies yesterday and 2 1/2 dozen today. How many dozen cookies did he bake?

   ____

3. Ann worked 15 2/3 hours last week and 14 1/2 hours this week. How many hours did she work altogether?

   ____

4. Mrs. Jones bought 5/8 yards of gold cloth and 1 3/4 yards of blue cloth. How many yards of cloth did she buy in all?

   ____

5. One wall in our classroom is 9 3/8 feet long. Another wall is 9 5/16 long. How long are both walls together?

   ____

Section 2

What This Section is About...

In this section you will practice subtracting fractions. Some of the skills you learned in the addition of fractions section will also be applied here.

SUBTRACTION

Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Subtracting proper fractions 2. Subtracting whole numbers from mixed numbers 3. Subtracting mixed numbers from whole numbers 4. Subtracting mixed numbers from mixed numbers	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Subtracting Proper Fractions**

?

How do you subtract proper fractions?

Example: Subtract like fractions: $\frac{6}{10} - \frac{2}{10}$

Step 1: Rename as fractions with like denominators, as necessary.

Step 2: Subtract numerators.

$$\frac{6}{10} - \frac{2}{10} = \underline{4}$$

Step 3: Write the difference over the denominator.

$$\frac{4}{10}$$

Step 4: Simplify.

$$\frac{4}{10} = \frac{2}{5}$$

Example: Subtract unlike fractions: $\frac{5}{10} - \frac{1}{5}$

Step 1: Find the LCD.

The LCD of $\frac{5}{10}$ and $\frac{1}{5}$ is 10.

Step 2: Write as fractions with like denominators, as necessary.

$$\frac{5}{10} = \frac{5}{10} \qquad \frac{1}{5} = \frac{2}{10}$$

Step 3: Subtract numerators, and write the difference over the denominator.

$$\begin{array}{r} \frac{5}{10} \\ -\ \frac{2}{10} \\ \hline \frac{3}{10} \end{array}$$

Step 4: Simplify, when possible.

Concept: **Subtracting Whole Numbers From Mixed Numbers**

?

How do you subtract whole numbers from mixed numbers?

Example: Subtract

$$\begin{array}{r} 7\frac{1}{4} \\ -\ 5 \\ \hline \end{array}$$

Step 1: Begin subtraction on the right. There is nothing to subtract *from* $\frac{1}{4}$.

$\frac{1}{4}$ take away nothing (or 0) is $\frac{1}{4}$

$$\begin{array}{r} 7\ \frac{1}{4} \\ -\ 5\ \phantom{\frac{1}{4}} \\ \hline \frac{1}{4} \end{array}$$

Step 2: Subtract the whole numbers.

$$\begin{array}{r} 7\ \frac{1}{4} \\ -\ 5\ \phantom{\frac{1}{4}} \\ \hline 2\ \frac{1}{4} \end{array} \qquad \text{Solution:} \qquad \begin{array}{r} 7\ \frac{1}{4} \\ -\ 5\ \phantom{\frac{1}{4}} \\ \hline 2\ \frac{1}{4} \end{array}$$

Concept: **Subtracting Mixed Numbers From Whole Numbers**

?

How do you subtract mixed numbers from whole numbers?

Example: Subtract and simplify.

$$\begin{array}{r} 7 \\ -\;5\frac{1}{4} \\ \hline \end{array}$$

Step 1: Begin subtraction on the right. Seven (7) is a whole number with no fraction. You cannot subtract $\frac{1}{4}$ from nothing or (0).

Step 2: The whole number 7 can be written as a mixed number by taking 1 from the 7 and then writing the 1 as a fraction with a denominator of 4. (Use 4 to have a common denominator with the $\frac{1}{4}$ in the subtrahend).

$$1 = \frac{4}{4}\;,\;\text{so}\;\; 7 = 6\frac{4}{4}$$

Step 3: Subtract the fractions.

$$\begin{array}{rcr} 7 & = & 6\frac{4}{4} \\ -\;5\frac{1}{4} & = & 5\frac{1}{4} \\ \hline & & \frac{3}{4} \end{array}$$

Step 4: Subtract the whole numbers, regrouping as necessary.

$$\begin{array}{rcr} 7 & = & 6\frac{4}{4} \\ -\;5\frac{1}{4} & = & 5\frac{1}{4} \\ \hline & & 1\frac{3}{4} \end{array}$$

Step 5: Simplify, when possible.

Concept: Subtracting Mixed Numbers From Mixed Numbers

?

How do you subtract mixed numbers from mixed numbers?

Example 1: Common denominator with no regrouping involving fractions

$$\begin{array}{r}38\,\frac{2}{3}\\ -\,28\,\frac{1}{3}\\ \hline \end{array}$$

Step 1: Draw a dotted line to separate the fraction and the whole number.

$$\begin{array}{r:l}38 & \frac{2}{3}\\ -\,28 & \frac{1}{3}\\ \hline & \end{array}$$

Step 2: Check to see if the fractions have common denominators.

$$\begin{array}{r}38\,\frac{2}{\textcircled{3}}\\ -\,28\,\frac{1}{\textcircled{3}}\\ \hline \end{array} \qquad \text{(Yes)}$$

Step 3: Subtract the *fractions.*

$$\begin{array}{rr}38 & \frac{2}{3}\\ -\,28 & \frac{1}{3}\\ \hline & \frac{1}{3}\end{array}$$

Step 4: Subtract the *whole* numbers.

$$\begin{array}{r} 38\frac{2}{3} \\ -\,28\frac{1}{3} \\ \hline 10\frac{1}{3} \end{array}$$

Step 5: Simplify, when necessary.

Solution: $10\frac{1}{3}$

Example 2: Unlike denominator with no regrouping involving fractions

$$\begin{array}{r} 26\frac{2}{\textcircled{4}} \\ -\,15\frac{1}{\textcircled{8}} \\ \hline \end{array}$$

Step 1: Check to see if the fractions have common denominators.

$$\begin{array}{r} 26\frac{2}{4} \\ -\,15\frac{1}{8} \\ \hline \end{array}$$

(No)

Step 2: Rename with common denominators.

$$\begin{array}{rcl} 26\frac{2 \times 2}{4 \times 2} & = & \frac{4}{8} \\ -\,15\frac{1}{8} & = & \frac{1}{8} \\ \hline \end{array}$$

Step 3: Subtract as before. Simplify.

$$\begin{array}{r} 26\,\frac{4}{8} \\ -15\,\frac{1}{8} \\ \hline 11\,\frac{3}{8} \end{array}$$

Example 3: Common denominator with regrouping

$$\begin{array}{r} 32\,\frac{1}{4} \\ -21\,\frac{3}{4} \\ \hline \end{array}$$

Step 1: Subtract the fractions. Notice that you must regroup because 3 cannot be subtracted from 1.

Step 2: Borrow 1 from 32 and change it to a fraction equal to 1 with a denominator of 4.

$$1 = \frac{4}{4}$$

Step 3: Add the $\frac{4}{4}$ to $\frac{1}{4}$.

$$\begin{array}{r} 3\overset{1}{\cancel{2}}\,\frac{1}{4} + \frac{4}{4} \\ -21\,\frac{3}{4} \\ \hline \end{array} \qquad \begin{array}{r} = 3\overset{1}{\cancel{2}}\,\frac{5}{4} \\ -21\,\frac{3}{4} \\ \hline \end{array}$$

Step 4: Subtract the fractions.

$$\begin{array}{rr} \overset{1}{3\cancel{2}} & \frac{5}{4} \\ -21 & \frac{3}{4} \\ \hline & \frac{2}{4} \end{array}$$

Step 5: Subtract the whole numbers.

$$\begin{array}{rr} \overset{1}{3\cancel{2}} & \frac{5}{4} \\ -21 & \frac{3}{4} \\ \hline 10 & \frac{2}{4} \end{array}$$

Step 6. Simplify the fraction.

$$\frac{2}{4} \div \frac{2}{2} = \frac{1}{2}$$

Solution: $10\frac{1}{2}$

Example 4: Unlike denominators with regrouping

$$\begin{array}{rr} 32 & \frac{1}{9} \\ -21 & \frac{1}{3} \\ \hline \end{array}$$

Step 1: Check to see if denominators are common (no). Find a common denominator, and rename appropriately.

$$\begin{array}{rrcrr} 32 & \frac{1}{9} & = & 32 & \frac{1}{9} \\ -21 & \frac{1 \times 3}{3 \times 9} & = & 21 & \frac{3}{9} \\ \hline \end{array}$$

Step 2: Regroup the fractions using either option from Example 3 and subtract.

Option 1:

$$\begin{array}{rcrcr} 32\frac{1}{9} & = & 3\overset{1}{\cancel{2}}\frac{1}{9}+\frac{9}{9} & = & 3\overset{1}{\cancel{2}}\frac{10}{9} \\ -\;21\frac{3}{9} & = & & & -\;21\frac{3}{9} \\ \hline & & & & \frac{7}{9} \end{array}$$

Option 2:

$$\begin{array}{rcrcr} 32\frac{1}{9} & = & 3\overset{1}{\cancel{2}}+\frac{10}{9} & = & 3\overset{1}{\cancel{2}}\frac{10}{9} \\ -\;21\frac{3}{9} & & & & -\;21\frac{3}{9} \\ \hline & & & & \frac{7}{9} \end{array}$$

Step 3: Subtract the whole numbers.

$$\begin{array}{r} 3\overset{1}{\cancel{2}}\frac{10}{9} \\ -\;21\frac{3}{9} \\ \hline 10\frac{7}{9} \end{array}$$

Step 4: Simplify, when necessary.

Solution : $10\frac{7}{9}$

Quiz

☞ **Directions:** Subtract. Show answers in reduced form.

1. $\begin{array}{r} \frac{2}{3} \\ -\ \frac{1}{3} \\ \hline \end{array}$

2. $\begin{array}{r} 8\frac{1}{5} \\ -\ 2\frac{1}{3} \\ \hline \end{array}$

3. $\begin{array}{r} 5\frac{3}{8} \\ -\ 3 \\ \hline \end{array}$

4. $\begin{array}{r} \frac{3}{4} \\ -\ \frac{7}{10} \\ \hline \end{array}$

5. $\begin{array}{r} 6 \\ -\ 1\frac{5}{8} \\ \hline \end{array}$

6. $\begin{array}{r} 6\frac{3}{10} \\ -\ 4\frac{5}{6} \\ \hline \end{array}$

7. $\begin{array}{r} 45\frac{1}{3} \\ -\ 23\frac{2}{3} \\ \hline \end{array}$

8. $\begin{array}{r} 14\frac{1}{4} \\ -\ 5\frac{2}{3} \\ \hline \end{array}$

9. $\begin{array}{r} 1\frac{4}{5} \\ -\ \frac{9}{10} \\ \hline \end{array}$

10. $\begin{array}{r} 6\frac{2}{5} \\ -\ \frac{5}{6} \\ \hline \end{array}$

11. $\begin{array}{r} 12\frac{2}{3} \\ -\ 1\frac{3}{8} \\ \hline \end{array}$

12. $\begin{array}{r} 5\frac{3}{5} \\ -\ 2 \\ \hline \end{array}$

Activity Sheet

☞ **Directions:** Subtract.

1. $\frac{3}{4} - \frac{1}{6} =$ ________

2. $\frac{9}{10} - \frac{1}{2} =$ ________

3. $\frac{5}{6} - \frac{2}{3} =$ ________

4. $\frac{1}{4} - \frac{1}{6} =$ ________

5. $\frac{5}{6} - \frac{1}{6} =$ ________

6. $\frac{5}{8} - \frac{1}{4} =$ ________

7. $\frac{7}{8} - \frac{5}{8} =$ ________

8. $\frac{7}{8} - \frac{1}{2} =$ ________

9. $\frac{7}{8} - \frac{4}{5} =$ ________

10. $\frac{7}{10} - \frac{2}{10} =$ ________

Activity Sheet

Directions: Subtract.

1. $\begin{array}{r} 14\frac{1}{2} \\ -\ 3 \\ \hline \end{array}$

2. $\begin{array}{r} 29\frac{2}{3} \\ -\ 15 \\ \hline \end{array}$

3. $\begin{array}{r} 9\frac{2}{5} \\ -\ 3 \\ \hline \end{array}$

4. $\begin{array}{r} 15\frac{3}{4} \\ -\ 8 \\ \hline \end{array}$

5. $\begin{array}{r} 68\frac{5}{6} \\ -\ 14 \\ \hline \end{array}$

6. $\begin{array}{r} 42\frac{3}{5} \\ -\ 18 \\ \hline \end{array}$

7. $\begin{array}{r} 8\frac{7}{8} \\ -\ 3 \\ \hline \end{array}$

8. $\begin{array}{r} 16\frac{1}{5} \\ -\ 8 \\ \hline \end{array}$

9. $\begin{array}{r} 75\frac{3}{10} \\ -\ 15 \\ \hline \end{array}$

10. $\begin{array}{r} 56\frac{4}{5} \\ -\ 29 \\ \hline \end{array}$

11. $\begin{array}{r} 45\frac{3}{4} \\ -\ 15 \\ \hline \end{array}$

12. $\begin{array}{r} 21\frac{2}{3} \\ -\ 14 \\ \hline \end{array}$

Activity Sheet

Directions: Subtract.

1. $\begin{array}{r} 38 \\ -\ 4\frac{1}{2} \\ \hline \end{array}$

2. $\begin{array}{r} 42 \\ -\ 13\frac{2}{3} \\ \hline \end{array}$

3. $\begin{array}{r} 15 \\ -\ 2\frac{3}{4} \\ \hline \end{array}$

4. $\begin{array}{r} 13 \\ -\ 2\frac{4}{5} \\ \hline \end{array}$

5. $\begin{array}{r} 93 \\ -\ \frac{1}{3} \\ \hline \end{array}$

6. $\begin{array}{r} 28 \\ -\ 14\frac{3}{5} \\ \hline \end{array}$

7. $\begin{array}{r} 36 \\ -\ 13\frac{1}{10} \\ \hline \end{array}$

8. $\begin{array}{r} 98 \\ -\ 72\frac{3}{8} \\ \hline \end{array}$

9. $\begin{array}{r} 32 \\ -\ 10\frac{4}{5} \\ \hline \end{array}$

10. $\begin{array}{r} 86 \\ -\ 19\frac{1}{6} \\ \hline \end{array}$

11. $\begin{array}{r} 57 \\ -\ \frac{4}{5} \\ \hline \end{array}$

12. $\begin{array}{r} 25 \\ -\ 14\frac{3}{4} \\ \hline \end{array}$

Activity Sheet

☞ **Directions:** Subtract.

1. $\begin{array}{r} 14\frac{1}{2} \\ -\ 10 \\ \hline \end{array}$

2. $\begin{array}{r} 29\frac{1}{5} \\ -\ 13 \\ \hline \end{array}$

3. $\begin{array}{r} 39 \\ -\ 12\frac{1}{2} \\ \hline \end{array}$

4. $\begin{array}{r} 46 \\ -\ 31\frac{3}{8} \\ \hline \end{array}$

5. $\begin{array}{r} 21\frac{4}{5} \\ -\ 15 \\ \hline \end{array}$

6. $\begin{array}{r} 92\frac{9}{10} \\ -\ 86 \\ \hline \end{array}$

7. $\begin{array}{r} 78 \\ -\ 15\frac{2}{3} \\ \hline \end{array}$

8. $\begin{array}{r} 42\frac{5}{8} \\ -\ 28 \\ \hline \end{array}$

9. $\begin{array}{r} 59\frac{1}{3} \\ -\ 20 \\ \hline \end{array}$

10. $\begin{array}{r} 67\frac{7}{10} \\ -\ 12 \\ \hline \end{array}$

11. $\begin{array}{r} 24\frac{2}{4} \\ -\ 14 \\ \hline \end{array}$

12. $\begin{array}{r} 40 \\ -\ 10\frac{5}{6} \\ \hline \end{array}$

Activity Sheet

Directions: Subtract. Express in simplest terms.

1. $$\begin{array}{r} 4\frac{2}{3} \\ -\ 2\frac{1}{3} \\ \hline \end{array}$$

2. $$\begin{array}{r} 57\frac{7}{8} \\ -\ 26\frac{3}{8} \\ \hline \end{array}$$

3. $$\begin{array}{r} 69\frac{7}{10} \\ -\ 46\frac{3}{10} \\ \hline \end{array}$$

4. $$\begin{array}{r} 31\frac{5}{6} \\ -\ 16\frac{1}{6} \\ \hline \end{array}$$

5. $$\begin{array}{r} 73\frac{4}{5} \\ -\ 26\frac{3}{5} \\ \hline \end{array}$$

6. $$\begin{array}{r} 64\frac{3}{4} \\ -\ 27\frac{1}{4} \\ \hline \end{array}$$

7. $$\begin{array}{r} 51\frac{2}{3} \\ -\ 17\frac{1}{3} \\ \hline \end{array}$$

8. $$\begin{array}{r} 83\frac{3}{10} \\ -\ 28\frac{1}{10} \\ \hline \end{array}$$

9. $$\begin{array}{r} 34\frac{7}{8} \\ -\ 16\frac{2}{8} \\ \hline \end{array}$$

10. $$\begin{array}{r} 90\frac{7}{8} \\ -\ \frac{5}{8} \\ \hline \end{array}$$

11. $$\begin{array}{r} 79\frac{4}{5} \\ -\ 4\frac{3}{5} \\ \hline \end{array}$$

12. $$\begin{array}{r} 21\frac{1}{2} \\ -\ 14\frac{1}{2} \\ \hline \end{array}$$

Activity Sheet

☞ **Directions:** Subtract. Express in simplest terms.

1. $\begin{array}{r} 42\frac{7}{8} \\ -21\frac{1}{4} \\ \hline \end{array}$

2. $\begin{array}{r} 63\frac{2}{3} \\ -49\frac{1}{6} \\ \hline \end{array}$

3. $\begin{array}{r} 35\frac{7}{10} \\ -16\frac{2}{5} \\ \hline \end{array}$

4. $\begin{array}{r} 65\frac{7}{8} \\ -\frac{5}{6} \\ \hline \end{array}$

5. $\begin{array}{r} 89\frac{2}{3} \\ -36\frac{1}{2} \\ \hline \end{array}$

6. $\begin{array}{r} 57\frac{4}{5} \\ -57\frac{1}{6} \\ \hline \end{array}$

7. $\begin{array}{r} 86\frac{1}{2} \\ -59\frac{1}{8} \\ \hline \end{array}$

8. $\begin{array}{r} 94\frac{3}{4} \\ -41\frac{2}{5} \\ \hline \end{array}$

9. $\begin{array}{r} 65\frac{5}{8} \\ -39\frac{1}{3} \\ \hline \end{array}$

10. $\begin{array}{r} 48\frac{7}{10} \\ -\frac{1}{3} \\ \hline \end{array}$

11. $\begin{array}{r} 43\frac{2}{3} \\ -35\frac{1}{5} \\ \hline \end{array}$

12. $\begin{array}{r} 55\frac{5}{6} \\ -23\frac{2}{3} \\ \hline \end{array}$

Activity Sheet

Directions: Subtract. Express in simplest terms.

1. $$\begin{array}{r} 65\frac{1}{4} \\ -\ 41\frac{3}{4} \\ \hline \end{array}$$

2. $$\begin{array}{r} 96\frac{3}{10} \\ -\ 41\frac{7}{10} \\ \hline \end{array}$$

3. $$\begin{array}{r} 87\frac{3}{8} \\ -\ 86\frac{7}{8} \\ \hline \end{array}$$

4. $$\begin{array}{r} 32\frac{1}{4} \\ -\ 11\frac{3}{4} \\ \hline \end{array}$$

5. $$\begin{array}{r} 31\frac{1}{3} \\ -\ 30\frac{2}{3} \\ \hline \end{array}$$

6. $$\begin{array}{r} 52\frac{1}{6} \\ -\ 41\frac{5}{6} \\ \hline \end{array}$$

7. $$\begin{array}{r} 30\frac{1}{5} \\ -\ 14\frac{2}{5} \\ \hline \end{array}$$

8. $$\begin{array}{r} 51\frac{1}{8} \\ -\ 36\frac{3}{8} \\ \hline \end{array}$$

9. $$\begin{array}{r} 73\frac{3}{5} \\ -\ 39\frac{4}{5} \\ \hline \end{array}$$

10. $$\begin{array}{r} 65\frac{1}{10} \\ -\ 42\frac{3}{10} \\ \hline \end{array}$$

11. $$\begin{array}{r} 25\frac{1}{5} \\ -\ 13\frac{1}{2} \\ \hline \end{array}$$

12. $$\begin{array}{r} 14\frac{1}{6} \\ -\ 10\frac{5}{6} \\ \hline \end{array}$$

Activity Sheet

☞ **Directions:** Subtract. Express in simplest terms.

1. $\begin{array}{r} 45\frac{1}{3} \\ -14\frac{7}{8} \\ \hline \end{array}$

2. $\begin{array}{r} 58\frac{1}{4} \\ -16\frac{2}{3} \\ \hline \end{array}$

3. $\begin{array}{r} 97\frac{1}{6} \\ -43\frac{3}{8} \\ \hline \end{array}$

4. $\begin{array}{r} 57\frac{3}{10} \\ -22\frac{3}{5} \\ \hline \end{array}$

5. $\begin{array}{r} 64\frac{1}{4} \\ -27\frac{7}{8} \\ \hline \end{array}$

6. $\begin{array}{r} 70\frac{2}{5} \\ -25\frac{3}{4} \\ \hline \end{array}$

7. $\begin{array}{r} 31\frac{1}{8} \\ -14\frac{3}{10} \\ \hline \end{array}$

8. $\begin{array}{r} 24\frac{1}{2} \\ -23\frac{7}{10} \\ \hline \end{array}$

9. $\begin{array}{r} 67\frac{3}{5} \\ -42\frac{5}{6} \\ \hline \end{array}$

10. $\begin{array}{r} 53\frac{1}{3} \\ -52\frac{7}{8} \\ \hline \end{array}$

11. $\begin{array}{r} 86\frac{1}{4} \\ -42\frac{3}{8} \\ \hline \end{array}$

12. $\begin{array}{r} 95\frac{3}{5} \\ -45\frac{2}{3} \\ \hline \end{array}$

Word Problems

Directions: Use the steps on page 18 or 33 to solve. Reduce, as necessary.

1. Find the total thickness of two pieces of wood that Jim has glued together if one is 5/8 in. thick and the other 13 3/4 in. thick.

   ____

2. Two months ago Karen weighed 123 1/4 lb. Now she weighs 116 3/4 lb. How many pounds did she lose?

   ____

3. During the week after school, Mary worked 3 3/4 hours on Monday, 2 1/2 hours on Wednesday, and 3 hours on Friday. How many hours did she work that week?

   ____

4. Coach Davis had three weight lifters make the following lifts on the bench press: 324 1/2 lb, 350 3/4 lb, and 299 1/4 lb. What was the total weight the three lifted?

   ____

5. What is the length of a machine part consisting of three joined pieces measuring 2 1/4 in., 1 3/8 in., and 1/2 in.?

   ____

6. If normal body temperature is 98 3/5 degrees, how many degrees above normal is a temperature of 101 degrees?

   ____

7. A full tray of seedlings has 6 small pots. A nursery ended the day with 14 full trays and 5/6 of another tray, after having begun the day with 36 2/3 trays. How many trays were sold?

   ____

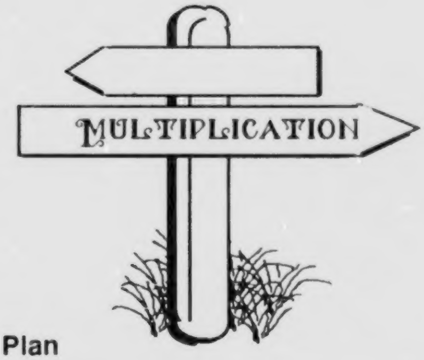
8. The Taylor High School Wildcats gained 315 3/5 yd in their first game and 327 3/4 yd in the second. What was the difference in the yardage gained?

   ____

Section 3

What This Section is About...

In this section you will practice multiplying fractions using various combinations of fractions and mixed numbers. You will use skills practiced earlier, such as simplifying.



Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Renaming a mixed number as an improper fraction 2. Multiplying two fractions 3. Multiplying two fractions, using cross cancelling 4. Multiplying fractions, mixed numbers, and whole numbers	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ See Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: Renaming a Mixed Number as an Improper Fraction

?

How do you rename a mixed number as an improper fraction?

Example: $6\frac{1}{2}$ means the same as ____.

Step 1. **6** is the whole number, **2** is the denominator, and **1** is the numerator.

Step 2: Multiply the whole number times the denominator.

$$6 \times 2 = 12$$

Step 3: Add the product from Step 2 to the numerator.

$$12 + 1 = 13$$

Step 4: Put the sum from Step 3 over the original denominator.

Solution: $6\frac{1}{2} = \frac{13}{2}$

Concept: Multiplying Two Fractions

?

How do you multiply two fractions?

Example: Multiply $\frac{2}{3} \times \frac{3}{8}$

Step 1: Multiply numerators.

$$\frac{2}{3} \times \frac{3}{8} = \frac{6}{\quad}$$

Step 2: Multiply denominators.

$$\frac{2}{3} \times \frac{3}{8} = \frac{6}{24}$$

Step 3: Simplify.

$$\frac{6}{24} = \frac{1}{4}$$

Concept: **Multiplying Two Fractions, Using Cross Cancelling**

?

How do you multiply two fractions, using cross cancelling?

Example 1: $\frac{8}{9} \times \frac{3}{4}$

Step 1: Look at the numerator of the first fraction and the denominator of the second fraction. Determine if they have a common factor other than 1.

$$\frac{\textcircled{8}}{9} \times \frac{3}{\textcircled{4}}$$

Four (4) is the common factor.

Step 2: Divide the numerator of the first fraction by 4 (8 ÷ 4 = 2). Cross out the 8 and write a 2 above it. Divide the denominator of the second fraction by the same number. (4 ÷ 4 = 1). Cross out the 4 and write a 1 below it.

$$\frac{\overset{2}{\cancel{8}}}{9} \times \frac{3}{\underset{1}{\cancel{4}}}$$

Step 3: Now do the same for the denominator of the first fraction and the numerator of the second fraction. Determine if they have a common factor.

$$\frac{8}{9} \times \frac{3}{4}$$

Three (3) is the common factor. Divide the denominator of the first fraction by 9 (9 ÷ 3 = 3). Cross out the 9 and write a 3 below it. Divide the numerator of the second fraction by 3 (3 ÷ 3 = 1). Cross out the 3 and write a 1 above it.

$$\frac{\overset{2}{\cancel{8}}}{\underset{3}{\cancel{9}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{4}}}$$

Step 4: Multiply the *new* numerators (2 x 1 = 2) and the new denominators (3 x 1 = 3). Simplify, when possible.

$$\frac{\overset{2}{\cancel{8}}}{\underset{3}{\cancel{9}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{4}}} = \frac{2}{3}$$

Example 2: $\frac{4}{9} \times \frac{6}{7} =$

Step 1: Look at the numerator of the first fraction and the denominator of the second fraction. Determine if they have a common factor.

$$\frac{\textcircled{4}}{9} \times \frac{6}{\textcircled{7}}$$

Step 1: In this case 4 and 7 *do not* have a common factor other than 1. There is nothing to cancel.

Step 2: Look at the denominator of the first fraction and the numerator of the second fraction. Determine if they have a common factor.

$$\frac{4}{\textcircled{9}} \times \frac{\textcircled{6}}{7}$$

Three (3) is a common denominator.

Step 3: Continue as in Example I. Simplify, as necessary.

Solution:

$$\frac{4}{\underset{3}{\cancel{9}}} \times \frac{\overset{2}{\cancel{6}}}{7} = \frac{8}{21}$$

Concept:

Multiplying Fractions, Mixed Numbers, and Whole Numbers

?

How do you multiply fractions, mixed numbers, and whole numbers?

Example 1: Multiply: $\frac{2}{3} \times 8$

Step 1: Rename the whole number as a fraction by using the whole number as the numerator and the value 1 as the denominator.

$$\frac{2}{3} \times \frac{8}{1} =$$

Step 2: Check to see if you can cross-cancel.

Step 3: Multiply the fractions as before.

$$\frac{2}{3} \times \frac{8}{1} = \frac{16}{3} = 5\frac{1}{3}$$

Example 2: $4\frac{1}{2} \times 5\frac{1}{3}$

Step 1: Rename the mixed numbers to improper fractions.

$$4\frac{1}{2} \times 5\frac{1}{3} = \frac{9}{2} \times \frac{11}{2} =$$

Step 2: Cross-cancel, if possible.

$$\frac{9}{2} \times \frac{11}{2} =$$

Step 3: Multiply the fractions. Simplify, if possible.

$$\frac{9}{2} \times \frac{11}{2} = \frac{99}{4} = 29\frac{3}{4}$$

Example 3: Multiply and rename in simplest form.

$$\begin{array}{r} 4\frac{2}{3} \\ \times\ \ 6 \\ \hline \end{array}$$

Step 1: If the problem is written vertically,

$$\begin{array}{r} 4\frac{2}{3} \\ \times\ \ 6 \\ \hline \end{array} \quad \updownarrow$$

rewrite it horizontally. ↔

$$4\frac{2}{3} \times 6 =$$

Step 2: Multiply as before.

$$\frac{14}{\underset{1}{\cancel{3}}} \times \frac{\overset{2}{\cancel{6}}}{1} = \frac{28}{1} = 28$$

Step 3: Rewrite the answer in simplest form.

$$\frac{14}{\underset{1}{\cancel{3}}} \times \frac{\overset{2}{\cancel{6}}}{1} =$$

Solution:

$$4\frac{2}{3} \times 6 = \frac{14}{\underset{1}{\cancel{3}}} \times \frac{\overset{2}{\cancel{6}}}{1} = \frac{28}{1} = 28$$

Quiz

Directions: Multiply, show answers in simplified form.

1. $\frac{3}{7} \times \frac{2}{5} =$ ______

2. $\frac{3}{4} \times \frac{7}{8} =$ ______

3. $\frac{4}{5} \times \frac{4}{5} =$ ______

4. $\frac{2}{3} \times \frac{7}{8} =$ ______

5. $\frac{7}{9} \times \frac{5}{10} =$ ______

6. $4 \times \frac{2}{3} =$ ______

7. $3 \times \frac{5}{6} =$ ______

8. $2\frac{1}{4} \times 8 =$ ______

9. $2\frac{1}{4} \times 1\frac{1}{5} =$ ______

10. $1\frac{1}{8} \times 3\frac{1}{3} =$ ______

Vocabulary

Directions: Study the words and definitions below.

cross cancellation — a method used before multiplying to make computing easier *Cancel* numerator to denominator

Example: $\frac{7}{8} \times \frac{5}{7}$ the 7's can be canceled

$$\frac{\overset{1}{\cancel{7}}}{8} \times \frac{5}{\underset{1}{\cancel{7}}} = \frac{1}{8} \times \frac{5}{1}$$

Example: $\frac{3}{4} \times \frac{8}{9}$ cancel with 3 and 9 and with 4 and 8

$$\frac{3}{4} \times \frac{8}{9} = \frac{1}{1} \times \frac{2}{3}$$

property of one — any number multiplied by 1 (one) is equal to itself

Example: $3 \times 1 = 3$

$$\frac{2}{5} \times 1 = \frac{2}{5}$$

This property is useful when finding equivalent fractions.

Activity Sheet

Directions: Rename the following mixed numbers as improper fractions.

Example: $4\frac{1}{5}$ means the same as ____________

$4\frac{1}{5}$

$4 \times 5 = 20$
$20 + 1 = 21$
$4\frac{1}{5} = \frac{21}{5}$

1. $3\frac{2}{5}$ = ________
2. $12\frac{1}{2}$ = ________
3. $5\frac{3}{10}$ = ________
4. $25\frac{7}{8}$ = ________
5. $8\frac{2}{3}$ = ________
6. $15\frac{3}{4}$ = ________
7. $6\frac{7}{10}$ = ________
8. $42\frac{1}{3}$ = ________
9. $16\frac{4}{5}$ = ________
10. $4\frac{3}{8}$ = ________
11. $10\frac{3}{8}$ = ________
12. $14\frac{2}{5}$ = ________

Activity Sheet

☞ **Directions**: Rename as mixed numerals or whole numbers.

1. $\frac{9}{4}$ = ________
2. $\frac{7}{4}$ = ________
3. $\frac{9}{5}$ = ________
4. $\frac{19}{2}$ = ________
5. $\frac{14}{3}$ = ________
6. $\frac{22}{7}$ = ________
7. $\frac{16}{2}$ = ________
8. $\frac{43}{7}$ = ________
9. $\frac{27}{5}$ = ________
10. $\frac{54}{6}$ = ________

Activity Sheet

☞ **Directions**: Rename each mixed numeral as a fraction.

1. $3\ \frac{3}{8}$ = ______ 2. $4\ \frac{3}{4}$ = ______ 3. $2\ \frac{5}{9}$ = ______

4. $5\ \frac{3}{7}$ = ______ 5. $2\ \frac{1}{5}$ = ______ 6. $8\ \frac{5}{6}$ = ______

7. $7\ \frac{3}{10}$ = ______ 8. $6\ \frac{1}{2}$ = ______ 9. $6\ \frac{4}{5}$ = ______

10. $9\ \frac{2}{3}$ = ______ 11. $1\ \frac{3}{5}$ = ______ 12. $5\ \frac{3}{9}$ = ______

Activity Sheet

Directions: Multiply. Show answers in reduced form.

1. $\frac{1}{4} \times \frac{3}{5} =$ ____________

2. $\frac{1}{6} \times \frac{5}{8} =$ ____________

3. $\frac{5}{9} \times \frac{1}{2} =$ ____________

4. $\frac{4}{5} \times \frac{2}{3} =$ ____________

5. $\frac{7}{8} \times \frac{1}{6} =$ ____________

6. $\frac{5}{8} \times \frac{3}{4} =$ ____________

7. $\frac{4}{7} \times \frac{3}{8} =$ ____________

8. $\frac{4}{9} \times \frac{7}{8} =$ ____________

9. $\frac{7}{8} \times \frac{2}{3} =$ ____________

10. $\frac{5}{8} \times \frac{6}{9} =$ ____________

Activity Sheet

Directions: Multiply. Write answer in simplest terms.

1. $\frac{3}{7} \times \frac{2}{5} =$ ________

2. $\frac{7}{8} \times \frac{1}{7} =$ ________

3. $\frac{5}{11} \times \frac{11}{21} =$ ________

4. $\frac{4}{5} \times \frac{3}{4} =$ ________

5. $\frac{3}{4} \times \frac{6}{7} =$ ________

6. $\frac{2}{3} \times \frac{1}{3} =$ ________

7. $\frac{2}{3} \times \frac{1}{2} =$ ________

8. $\frac{5}{6} \times \frac{2}{4} =$ ________

9. $\frac{5}{9} \times \frac{3}{4} =$ ________

10. $\frac{7}{8} \times \frac{1}{6} =$ ________

Activity Sheet

☞ **Directions:** Multiply. Write answer in simplest terms.

1. $\frac{2}{3} \times \frac{1}{5} =$ ________

2. $\frac{5}{7} \times \frac{1}{4} =$ ________

3. $\frac{1}{2} \times \frac{1}{2} =$ ________

4. $\frac{9}{10} \times \frac{2}{5} =$ ________

5. $\frac{3}{4} \times \frac{7}{8} =$ ________

6. $\frac{3}{2} \times \frac{2}{3} =$ ________

7. $\frac{5}{6} \times \frac{2}{7} =$ ________

8. $\frac{1}{2} \times \frac{1}{2} =$ ________

9. $\frac{3}{5} \times \frac{1}{3} =$ ________

10. $\frac{6}{8} \times \frac{1}{4} =$ ________

Activity Sheet

☞ **Directions**: Multiply. Cross cancel and simplify, if possible.

1. $\frac{2}{3} \times \frac{9}{6} =$ ____________

2. $\frac{4}{5} \times \frac{15}{2} =$ ____________

3. $\frac{5}{6} \times \frac{12}{5} =$ ____________

4. $\frac{8}{9} \times \frac{15}{6} =$ ____________

5. $\frac{8}{3} \times \frac{25}{3} =$ ____________

6. $\frac{7}{8} \times \frac{12}{3} =$ ____________

7. $\frac{12}{5} \times \frac{15}{1} =$ ____________

8. $\frac{4}{7} \times \frac{18}{5} =$ ____________

9. $\frac{26}{7} \times \frac{3}{4} =$ ____________

10. $\frac{4}{7} \times \frac{21}{8} =$ ____________

Activity Sheet

☞ **Directions:** Multiply. Simplify, as needed.

1. $\frac{3}{8} \times \frac{2}{5} =$ ________

2. $\frac{1}{6} \times \frac{3}{5} =$ ________

3. $\frac{2}{5} \times \frac{7}{8} =$ ________

4. $\frac{5}{7} \times \frac{3}{8} =$ ________

5. $\frac{6}{7} \times \frac{5}{6} =$ ________

6. $\frac{8}{9} \times \frac{3}{5} =$ ________

7. $\frac{2}{3} \times \frac{5}{8} =$ ________

8. $\frac{1}{4} \times \frac{8}{9} =$ ________

9. $\frac{8}{3} \times \frac{3}{8} =$ ________

10. $\frac{5}{6} \times \frac{1}{10} =$ ________

Activity Sheet

☞ **Directions**: Write as a mixed number.

1. $\frac{109}{5}$ ________

2. $\frac{52}{8}$ ________

☞ **Directions**: Write as a fraction.

3. $6\frac{1}{6}$ ________

4. $39\frac{5}{8}$ ________

☞ **Directions**: Show answers in lowest terms.

5. $\frac{2}{3} \times 8 =$ ________

6. $7\frac{5}{8} \times 3\frac{1}{5} =$ ________

7. $15\frac{5}{6} \times 1\frac{1}{2} =$ ________

8. $1\frac{4}{5} \times 2\frac{7}{9} =$ ________

9. $21\frac{1}{3} \times \frac{3}{8} =$ ________

10. $\frac{5}{8} \times 1\frac{7}{9} =$ ________

Activity Sheet

Directions: Multiply. Show answers in simplest terms.

1. $3\frac{1}{5} \times 15 =$ ________

2. $6 \times 2\frac{1}{9} =$ ________

3. $2 \times 6\frac{1}{8} =$ ________

4. $5\frac{1}{2} \times 8 =$ ________

5. $3\frac{3}{4} \times 8 =$ ________

6. $4\frac{3}{4} \times 2 =$ ________

7. $7\frac{1}{5} \times 10 =$ ________

8. $8 \times 2\frac{1}{4} =$ ________

9. $5 \times 4\frac{1}{10} =$ ________

10. $9 \times 3\frac{1}{8} =$ ________

Activity Sheet

Directions: Multiply. Show answers in reduced form.

1. $\frac{8}{9} \times \frac{1}{4} =$ ______

2. $3\frac{1}{3} \times 2 =$ ______

3. $\frac{5}{8} \times 40 =$ ______

4. $2\frac{1}{2} \times \frac{1}{10} =$ ______

5. $\frac{7}{10} \times \frac{5}{6} =$ ______

6. $\frac{3}{4} \times \frac{5}{8} =$ ______

7. $3\frac{1}{2} \times 2\frac{1}{3} =$ ______

8. $5 \times \frac{7}{8} =$ ______

9. $2\frac{1}{3} \times 12 =$ ______

10. $5\frac{1}{3} \times 8\frac{1}{2} =$ ______

Activity Sheet

Directions: Multiply. Show answers in reduced form.

1. $3\frac{2}{3} \times 15\frac{1}{3} =$ ________

2. $14 \times 5\frac{7}{9} =$ ________

3. $\frac{7}{8} \times 15 =$ ________

4. $5\frac{6}{8} \times 9\frac{1}{2} =$ ________

5. $\frac{9}{10} \times 2\frac{1}{2} =$ ________

6. $13 \times 3\frac{4}{5} =$ ________

7. $22\frac{1}{2} \times \frac{5}{6} =$ ________

8. $2\frac{3}{4} \times \frac{3}{5} =$ ________

9. $7\frac{3}{5} \times 4\frac{2}{3} =$ ________

10. $\frac{3}{8} \times 4\frac{1}{6} =$ ________

Activity Sheet

☞ **Directions**: Multiply. Rename in simplest form.

1. $\begin{array}{r} 3\frac{2}{5} \\ \times\ 4 \\ \hline \end{array}$

2. $\begin{array}{r} 12 \\ \times\ 3\frac{1}{4} \\ \hline \end{array}$

3. $\begin{array}{r} 7\frac{2}{3} \\ \times\ 4 \\ \hline \end{array}$

4. $\begin{array}{r} 5\frac{2}{7} \\ \times\ 6 \\ \hline \end{array}$

5. $\begin{array}{r} 8\frac{1}{3} \\ \times\ 4 \\ \hline \end{array}$

6. $\begin{array}{r} 5\frac{1}{2} \\ \times\ 2 \\ \hline \end{array}$

Activity Sheet

☞ **Directions:** Multiply. Simplify answers.

1. $\frac{2}{3} \times 8\frac{2}{5} =$
2. $7\frac{1}{2} \times \frac{1}{3} =$
3. $\frac{1}{6} \times 32 =$
4. $\frac{9}{10} \times 1\frac{1}{9} =$
5. $5\frac{1}{4} \times 2\frac{2}{7} =$
6. $7\frac{5}{8} \times 3\frac{1}{5} =$
7. $9\frac{1}{3} \times 1\frac{3}{7} =$
8. $2 \times \frac{5}{6} =$
9. $24 \times \frac{1}{8} =$
10. $\frac{3}{8} \times 9\frac{1}{2} =$

Activity Sheet

Directions: Multiply. Simplify answers.

1. $2\frac{7}{8} \times 32 =$

2. $2\frac{2}{3} \times 5\frac{1}{3} =$

3. $9\frac{8}{9} \times 5\frac{2}{3} =$

4. $6\frac{7}{8} \times 3\frac{2}{3} =$

5. $5\frac{7}{9} \times 2\frac{1}{2} =$

6. $9 \times \frac{1}{2} =$

7. $12\frac{1}{8} \times 9\frac{2}{9} =$

8. $\frac{8}{9} \times 7\frac{5}{6} =$

9. $\frac{2}{3} \times 6\frac{7}{8} =$

10. $2\frac{2}{5} \times 7\frac{5}{6} =$

Word Problems

☞ **Directions**: Use the steps on page 53 to solve the problems. Reduce, if possible.

1. Mrs. Jones had 3/8 of a pie. She gave Jack 2/3 of what she had. What part of the whole pie did Jack get?

____

2. A piece of shelving is 27/36 yards long. Curtis used 1/3 of it. How much of a yard did he use?

____

3. Diane sold 3/4 dozen doughnuts to one customer. How many doughnuts did the customer buy?

____

4. A 3/4 majority is 3/4 of the total number of votes. A club at school must have a 3/4 majority vote to pass a new bylaw. There are 32 members. How many votes are needed to pass a new bylaw?

____

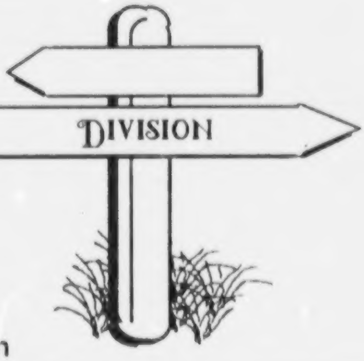
5. You want to increase a recipe from 2 servings to 6 servings. The recipe calls for 1 3/4 cups of sugar. How many cups will be needed to increase the servings to 6?

____

Section 4

What This Section is About...

In this section you will practice dividing fractions. Skills learned earlier, such as multiplication, cross-cancellation, and reducing will be helpful in dividing fractions.



Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Dividing two fractions 2. Dividing a fraction and a whole number 3. Dividing two mixed numbers	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Dividing Two Fractions**

?

How do you divide two fractions?

Example: Divide and simplify.

$$\frac{2}{3} \div \frac{4}{9} =$$

Step 1: Identify the divisor by reading the problem.

$\frac{2}{3} \div \frac{4}{9}$ is $\frac{2}{3}$ divided by $\frac{4}{9}$

so $\frac{4}{9}$ is the divisor

Step 2: Invert the divisor, and change the division sign to a multiplication sign.

$$\frac{2}{3} \div \frac{4}{9} = \frac{2}{3} \times \frac{9}{4} =$$

Step 3: Multiply, and simplify, when necessary. (Use cross-cancellation, if possible.)

$$\frac{18}{12} = \frac{3}{2} = 1\frac{1}{2}$$

Concept: **Dividing a Fraction and a Whole Number**

?

How do you divide a fraction and a whole number?

Example: Divide and simplify.

$$3 \div \frac{5}{6} =$$

Step 1: Write the whole number as a fraction by using the number one (1) as the denominator.

$$3 \div \frac{5}{6} = \frac{3}{1} \div \frac{5}{6}$$

Step 2: Invert the divisor (after reading the problem) and change the division sign to a multiplication sign.

$$\frac{3}{1} \div \frac{5}{6} \text{ is } \frac{3}{1} \text{ divided by } \frac{5}{6} =$$

$$\frac{3}{1} \div \frac{5}{6} \text{ is } \frac{3}{1} \times \frac{6}{5} =$$

Step 3: Multiply and simplify, if posssible.

$$\frac{3}{1} \times \frac{6}{5} = \frac{18}{5} = 3\frac{3}{5}$$

Concept: **Dividing Two Mixed Numbers**

?

How do you divide two mixed numbers?

Example: Divide. Show answer in simplest form.

$$2\frac{1}{4} \div 3\frac{1}{2} =$$

Step 1: Rename mixed numbers as improper fractions.

$$2\frac{1}{4} \div 3\frac{1}{2} = \frac{9}{4} \div \frac{7}{2}$$

Step 2: Divide, as before. Invert the divisor; change the division sign to multiplication and multiply.

$$\frac{9}{4} \div \frac{7}{2} = \frac{9}{\underset{2}{\cancel{4}}} \times \frac{\overset{1}{\cancel{2}}}{7} = \frac{9}{14}$$

Step 3: Simplify, if possible.

$\frac{9}{14}$ is in simplest form.

Quiz

Directions: Divide. Show answers in reduced form.

1. $\frac{1}{3} \div \frac{3}{4} =$ ________

2. $\frac{7}{8} \div 2 =$ ________

3. $2\frac{5}{8} \div \frac{3}{5} =$ ________

4. $8 \div \frac{1}{2} =$ ________

5. $4 \div 5\frac{1}{3} =$ ________

6. $\frac{5}{6} \div \frac{7}{8} =$ ________

7. $11\frac{1}{3} \div 2\frac{5}{6} =$ ________

8. $4\frac{2}{3} \div 2 =$ ________

9. $3\frac{3}{10} \div 2\frac{1}{8} =$ ________

10. $1\frac{1}{6} \div 9\frac{1}{3} =$ ________

Vocabulary

Directions: Study words and definitions.

invert — to make the numerator the denominator, and the denominator the numerator; to turn upside down

(Example: to turn $\frac{3}{4}$ into $\frac{4}{3}$.)

reciprocal — two numbers whose product is equal to one. Any number when multiplied by its reciprocal will equal one

Examples:

The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$, $\frac{2}{3} \times \frac{3}{2} = 1$

The reciprocal of 5 is $\frac{1}{5}$, $5 \times \frac{1}{5} = 1$

The reciprocal of $\frac{1}{7}$ is 7, $\frac{1}{7} \times 7 = 1$

Activity Sheet

☞ **Directions:** Write the reciprocals for each of the following numbers.

1. $\frac{2}{3}$ = _____ 2. $\frac{1}{2}$ = _____ 3. $\frac{3}{4}$ = _____

4. $\frac{7}{8}$ = _____ 5. $1\frac{1}{2}$ = _____ 6. $3\frac{2}{3}$ = _____

7. 8 = _____ 8. $\frac{1}{9}$ = _____ 9. $\frac{7}{16}$ = _____

10. 15 = _____ 11. $\frac{10}{100}$ = _____ 12. $2\frac{3}{2}$ = _____

Activity Sheet

☞ **Directions**: Divide and reduce.

1. $\frac{1}{2} \div \frac{5}{6} =$ ______

2 $\frac{8}{9} \div \frac{1}{3} =$ ______

3. $\frac{7}{8} \div \frac{1}{6} =$ ______

4. $\frac{9}{10} \div \frac{3}{5} =$ ______

5. $\frac{5}{9} \div \frac{2}{3} =$ ______

6. $\frac{5}{6} \div \frac{1}{4} =$ ______

7 $\frac{5}{6} \div \frac{3}{4} =$ ______

8 $\frac{3}{4} \div \frac{7}{10} =$ ______

9. $\frac{5}{6} \div \frac{5}{7} =$ ______

10. $\frac{5}{9} \div \frac{4}{5} =$ ______

Activity Sheet

Directions: Divide. Reduce answers to lowest terms.

1. $\frac{3}{5} \div \frac{1}{2} =$ ______

2. $\frac{7}{6} \div \frac{2}{3} =$ ______

3. $\frac{2}{5} \div \frac{1}{6} =$ ______

4. $\frac{3}{4} \div \frac{3}{4} =$ ______

5. $\frac{5}{8} \div \frac{3}{4} =$ ______

6. $\frac{3}{4} \div \frac{1}{4} =$ ______

7. $\frac{4}{9} \div \frac{3}{8} =$ ______

8. $\frac{5}{9} \div \frac{20}{3} =$ ______

9. $\frac{7}{8} \div \frac{7}{8} =$ ______

10. $\frac{2}{3} \div \frac{1}{3} =$ ______

Activity Sheet

Directions: Divide and simplify.

1. $2 \div \frac{3}{4} =$ ________________

2. $\frac{1}{2} \div 2 =$ ________________

3. $3 \div \frac{4}{5} =$ ________________

4. $7 \div \frac{8}{9} =$ ________________

5. $\frac{8}{9} \div 7 =$ ________________

Activity Sheet

☞ **Directions**: Divide and simplify.

1. $6 \div 4\frac{1}{2} =$ __________

2. $9 \div 2\frac{1}{4} =$ __________

3. $18 \div 2\frac{1}{4} =$ __________

4. $2\frac{7}{8} \div 3 =$ __________

5. $3\frac{1}{3} \div 5 =$ __________

6. $2\frac{1}{2} \div 2 =$ __________

7. $5 \div 2\frac{1}{2} =$ __________

8. $4\frac{3}{8} \div 2 =$ __________

9. $\frac{5}{8} \div 3 =$ __________

10. $8\frac{2}{5} \div 7 =$ __________

Activity Sheet

Directions: Divide. Show answers in reduced form.

1. $4\frac{1}{2} \div \frac{3}{5} =$ ________

2. $14\frac{3}{8} \div 2\frac{7}{8} =$ ________

3. $2\frac{2}{3} \div \frac{9}{16} =$ ________

4. $6\frac{13}{16} \div 6\frac{13}{16} =$ ________

5. $3\frac{3}{8} \div 3\frac{1}{5} =$ ________

6. $2\frac{1}{8} \div \frac{9}{10} =$ ________

7. $3\frac{3}{4} \div 4\frac{2}{5} =$ ________

8. $1\frac{7}{8} \div 1\frac{1}{3} =$ ________

9. $6\frac{2}{3} \div 13\frac{1}{5} =$ ________

10. $11\frac{1}{4} \div 2\frac{1}{2} =$ ________

Activity Sheet

☞ **Directions**: Divide. Reduce answers to lowest terms.

1. $\frac{1}{3} \div \frac{1}{4} =$ ______

2. $\frac{2}{5} \div \frac{9}{10} =$ ______

3. $\frac{1}{2} \div \frac{3}{5} =$ ______

4. $\frac{4}{5} \div \frac{7}{10} =$ ______

5. $\frac{2}{3} \div \frac{3}{5} =$ ______

6. $\frac{2}{5} \div \frac{3}{10} =$ ______

7. $7 \div \frac{1}{8} =$ ______

8. $10 \div \frac{5}{8} =$ ______

9. $\frac{9}{10} \div 6 =$ ______

10. $8 \div 2\frac{2}{5} =$ ______

Activity Sheet

Directions: Divide the following problems, and show answers in reduced form.

1. $\frac{4}{5} \div \frac{4}{5} =$ ______

2. $\frac{5}{8} \div \frac{5}{8} =$ ______

3. $6 \div 1\frac{2}{3} =$ ______

4. $1\frac{1}{8} \div \frac{3}{4} =$ ______

5. $1\frac{3}{5} \div \frac{2}{3} =$ ______

6. $2\frac{3}{5} \div \frac{5}{8} =$ ______

7. $8\frac{1}{3} \div 1\frac{5}{6} =$ ______

8. $2\frac{1}{2} \div 3\frac{3}{4} =$ ______

9. $4\frac{1}{4} \div 2\frac{4}{8} =$ ______

10. $11\frac{5}{6} \div 11\frac{4}{7} =$ ______

Word Problems

☞ **Directions**: Use the steps on page 71 to solve. Reduce, if possible.

1. Mr. Rogers earns $5.00 per hour. If he gets time and one-half for overtime, what is his hourly rate for overtime work?

2. If a skirt requires 3 1/3 yards of material, how many skirts can be made from a bolt of 30 yards of material?

3. Each class lasts 5/6 of an hour. How many hours are there in seven class periods?

4. Riding her bicycle, Maria averages 9 1/2 miles per hour. At that speed, how far could she go in 2 2/3 hours?

5. How much would a pound of peas cost if 2 1/2 lb of peas cost 72¢ (round to nearest whole number)?

6. Three-fourths of a gallon of milk is poured into twelve glasses. How much milk is in each glass, if they all have the same amount?

7. Miss Smith worked at the Family Fitness Center 41 3/4 hours over a five day period. What was her average number of hours worked per day?

8. If an airplane flies 252 miles in 3/4 hours, what is the average speed in miles per hour?

9. Find the cost of 2 1/4 pounds of bananas at 32¢ per pound?

10. A house worth $52,800 is assessed at 2/3 of its value. What is the assessed value?

UNIT 3: DECIMALS

Section 1: Addition
Section 2: Subtraction
Section 3: Multiplication
Section 4: Division
Section 5: Rounding

Section 1

What This Section is About...

In this section you will practice adding four- or five-digit decimal numbers, each having no more than three decimal numbers.

Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? • Adding decimal numbers	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Adding Decimal Numbers**

?

How do you add decimal numbers?

Step 1: Write in vertical form aligning decimal points. (Note: decimal point added to 3569.)

$$\begin{array}{r@{.}l} 15 & 95 \\ 3569 & \\ + \quad\quad & 3 \\ \hline \end{array}$$

Step 2: Put zeros in blank spaces to right of decimal points.

$$\begin{array}{r@{.}l} 15 & 95 \\ 3569 & \mathbf{00} \\ + \quad\quad & 30 \\ \hline \end{array}$$

Step 3: Add each column and place the decimal point in the sum directly under the decimals in the problem.

$$\begin{array}{r@{.}l} 15 & 95 \\ 3569 & 00 \\ + \quad\quad & 30 \\ \hline 3585 & 25 \end{array}$$

Quiz

Directions: Add.

1. $$\begin{array}{r} .3 \\ .2 \\ +\ \ .4 \\ \hline \end{array}$$

2. $$\begin{array}{r} .63 \\ .25 \\ .26 \\ +\ \ .48 \\ \hline \end{array}$$

3. $$\begin{array}{r} 6.5 \\ 9.1 \\ +\ \ 8.7 \\ \hline \end{array}$$

4. $$\begin{array}{r} 2.96 \\ .7 \\ +\ \ .12 \\ \hline \end{array}$$

5. $$\begin{array}{r} .9 \\ .10 \\ +3\ \ \\ \hline \end{array}$$

6. $$\begin{array}{r} 3.60 \\ 4.90 \\ +\ \ 5.80 \\ \hline \end{array}$$

7. $$\begin{array}{r} 2.103 \\ 4.839 \\ +\ \ 3.452 \\ \hline \end{array}$$

8. $$\begin{array}{r} 7.49 \\ +\ \ 5.6 \\ \hline \end{array}$$

9. $$\begin{array}{r} 1.5 \\ 2.1 \\ +\ \ 4.1 \\ \hline \end{array}$$

10. $$\begin{array}{r} 48.50 \\ 23.95 \\ +\ 49.99 \\ \hline \end{array}$$

11. $$\begin{array}{r} 236.44 \\ 511.99 \\ 661.38 \\ +\ \ 217.77 \\ \hline \end{array}$$

12. $$\begin{array}{r} \$.50 \\ .28 \\ .01 \\ +\ \ 9.10 \\ \hline \end{array}$$

13. $$\begin{array}{r} 42.87 \\ .05 \\ +\ \ 5.02 \\ \hline \end{array}$$

14. $$\begin{array}{r} 19.47 \\ 8.46 \\ 592.31 \\ +\ \ 6.11 \\ .09 \\ \hline \end{array}$$

15. \$1.43 + \$5.09 + \$.89 + \$ .05 = ______________

16. .976 + .287 = ______________

17. .08 + 80 = ______________

18. \$1.50 + .05 = ______________

19. \$2.75 + \$3.35 + \$93.75 = ______________

20. 8.41 + 241.09 = ______________

Vocabulary

☞ **Directions**: Study the vocabulary words below.

decimal — a decimal fraction, meaning a fraction whose denominator is a ten or a power of ten, expressed by placing a decimal point to the left of the numerator.

(Example: $.2 = \frac{2}{10}$)

decimal point — a period placed before a fraction expressed in decimal figures and read as "and"

(Example: 2 . 03 ; . 25)

mixed decimal — a decimal numeral with a value greater than one, that is, having a whole number part as well as a decimal part.

(Example: 37.15)

☞ **Directions**: Box all mixed decimals. Circle all decimal numbers.

	A	B	C	D
1.	4,569	4.569	.4569	0.45
2.	.354	3,548	068	.068
3.	39,487	.394	3.9487	.395
4.	94.268	94,268	.94268	9.4268

Activity Sheet

☞ **Directions:** Add.

1. .6
+ .2

2. .04
+ .05

3. .2
.3
.1
+ .5

4. .86
+ .26

5. .98
+ .89

6. .08 + 1.5 = ________

7. .62 + .573 = ________

8. .8 + .5 = ________

9. .05 + .10 = ________

10. 5.01
+ 2.999

11. 20.65
+ 27.14

12. .6
+ 4.

13. 8.3407
+ 2.1156

14. .7 + .83 + .53 = ________

15. 1.6 + 8.62 + .30 = ________

16. .036
+ .1

17. .15
+ .1785

18. 1.4
+ 26
.39

19. 335.48
+ .94

20. .9
5.0
+ .019

Activity Sheet

Directions: Add.

1.
.09
.08
.07
.05
+ .06

2.
.31
.71
.17
.18
+ .29

3.
.9
+ 2.1

4.
7.053
.96
+ 1.8

5. .52 + .38 + .53 = __________

6. $ .23 + $ .75 = __________

7. $100 + $ .05 + $ .98 = __________

8. .07 + 8 + 19.3 = __________

9. .1692 + .1894 + 3 = __________

10. .08 + 9 + 100 = __________

Activity Sheet

Directions: Add.

1. 4.2 + 3.7 = __________

2. 2.4 + 5.9 = __________

3. 13.8 + 9.1 = __________

4. 5.847 + 4.396 = __________

5. 81 + .57 = __________

6. .062 + .814 = __________

7. 1.098 + 8.635 + 2.174 = __________

8. .32 + 1.68 + 21.74 = __________

9. 1.039 + 3.684 + .1 = __________

10. 17.5 + 2.46 + 8.3 = __________

11. 29.387 + 13.04 + 2.1 = __________

12. .942 + .7 + .48 = __________

13. 85 + .002 = __________

14. 5.37 + 60.01 + .23 = __________

15. 8.277 + 9.811 + 93.2 = __________

16. 65.93 + 712.01 = __________

17. $.05 + $ .95 = __________

18. $21.05 + $216.76 + $ .09 = __________

19. $500.02 + $36.88 + $.05 = __________

20. $999.01 + $ .99 = __________

Activity Sheet

Directions: Add. Write each answer in the blank provided.

1. 6.3 + 7.4 = ________

2. 68.2 + 4.91 = ________

3. .63 + .57 = ________

4. .64 + 2.5 = ________

5. .62 + 4.308 + 5.5 = ________

6. 4.723 + .023 + 6.4 = ________

7. 14 + 7 + .28 = ________

8. 5 + .023 + 12.63 = ________

9. 6.14 + 20.1 = ________

10. 31 + .662 + 12.55 = ________

11. 7.43 + 6.078 = ________

12. 14.67 + .99 + 1.20 = ________

13. 16.89 + .001 = ________

14. 49.2 + .9062 = ________

15. 1.8 + 2.63 + .79 = ________

16. 8.725 + 3.25 + .99 = ________

17. .684 + .703 + .9 + 19 = ________

18. 1.039 + 63.885 + .15 = ________

19. $175.86 + $42.65 = ________

20. $140.50 + $15.28 = ________

Word Problems

☞ **Directions**: Follow the steps on page 18 to solve the problems. Show your work. Write each answer on the line.

1. John Jones owns a small clothing store. At the end of the day, he had charge slips of $86.50, $43.20, $19.95, $12.09, and $17.59. What was the total amount of charges for the day?

____

2. Mr. Adams works for a gas station. During one hour, he pumped 15.7 gallons, 7.5 gallons, 10.2 gallons, and 12 gallons of gas. How much did he pump that hour?

____

3. Rhonda wanted to add baseboard to three sides of her bedroom. The sides measured 2.64 meters, 3.025 meters, and 3.2 meters. How much baseboard does she need?

____

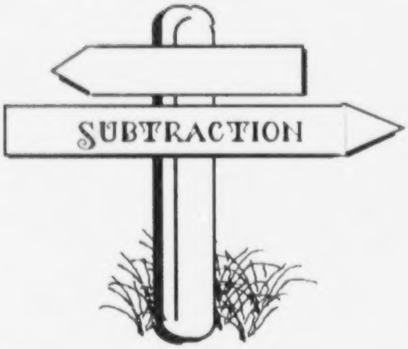
4. George is a jogger. Yesterday he jogged 38.643 minutes. Today he jogged 93.2 minutes. How many minutes did he jog in the two days?

____

Section 2

What This Section is About...

In this section you will practice subtracting decimal numbers with or without regrouping, of five-digit mixed decimal numbers, having no more than three decimal places.



Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? • Subtracting decimal numbers	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concepts: **Subtracting Decimal Numbers**

?

How do you subtract decimal numbers?

Step 1: Rewrite problem in vertical form.

$$\begin{array}{r} 2964. \\ -\quad 3.985 \\ \hline \end{array}$$

Step 2: Put zeros in blank spaces, so all numerals have same number of digits to right of decimal.

$$\begin{array}{r} 2964.000 \\ -\quad 3.985 \\ \hline \end{array}$$

Step 3: Subtract each column. Place decimal point in the difference directly below decimal point in problem. Borrow to left, if necessary.

$$\begin{array}{cccccccc} & & & & & 9 & 9 & \\ & & & 3 & & \cancel{10} & \cancel{10} & 10 \\ 2 & 9 & 6 & \cancel{4} & . & \cancel{0} & \cancel{0} & \cancel{0} \\ - & & & 3 & . & 9 & 8 & 5 \\ \hline 2 & 9 & 6 & 0 & . & 0 & 1 & 5 \end{array}$$

Quiz

Directions: Subtract. Show your work.

1. $\begin{array}{r} .8 \\ -\ .2 \\ \hline \end{array}$

2. $\begin{array}{r} .38 \\ -\ .24 \\ \hline \end{array}$

3. $\begin{array}{r} 67 \\ -\ .47 \\ \hline \end{array}$

4. $\begin{array}{r} .05 \\ -\ .02 \\ \hline \end{array}$

5. $\begin{array}{r} 4.6 \\ -\ 3.1 \\ \hline \end{array}$

6. $\begin{array}{r} .6593 \\ -\ .4978 \\ \hline \end{array}$

7. $\begin{array}{r} 83.452 \\ -\ 49.596 \\ \hline \end{array}$

8. $\begin{array}{r} 5 \\ -\ 1.43 \\ \hline \end{array}$

9. $\begin{array}{r} \$176.27 \\ -\ 93.48 \\ \hline \end{array}$

10. $\begin{array}{r} 3.56 \\ -\ .8 \\ \hline \end{array}$

11. $\begin{array}{r} .9 \\ -\ .735 \\ \hline \end{array}$

12. $\begin{array}{r} \$16 \\ -\ 1.50 \\ \hline \end{array}$

13. .15 − .08 = ____________

14. .7 − .625 = ____________

15. 4.2 − .83 = ____________

16. 9 − .05 = ____________

17. $16 − $1.50 = ____________

18. .3 − .08 = ____________

19. .375 − .2 = ____________

20. $5 − $ .05 = ____________

Activity Sheet

Directions: Subtract.

1. .9 − .5

2. .7 − .2

3. .58 − .29

4. .44 − .09

5. .36 −.16

6. .835 − .214

7. 7.64 − 3.53

8. 18.5 − 6.2

9. 5.724 − 3.856

10. .749 − .729

11. 8 − 7.3

12. .07 − .0628

13. 6 − 4.605

14. 4.9 − .807

15. $193.45 − $108.91 = ______

16. $85.75 − $47.13 = ______

17. $10 − $ .09 = ______

18. $250 − $133.62 = ______

19. $2.84 − $1.75 = ______

20. $ .50 − $ .27 = ______

Activity Sheet

☞ **Directions:** Subtract.

1. 8 − .5 = ________

2. 12 − 8.2003 = ________

3. 2 − 1.7 = ________

4. 6.03 − 1.054 = ________

5. 23.4 − .004 = ________

6. 10 − .12 = ________

7. 18.01 − .002 = ________

8. 27 − .0067 = ________

9. .685 − .5903 = ________

10. .5842 − .034 = ________

Activity Sheet

Directions: Subtract.

1. 4.4 − 2.531 = ________

2. 82.45 − 3.783 = ________

3. 92.405 − 3.008 = ________

4. 6.3 − 3.4 = ________

5. 26.3 − 2.45 = ________

6. 16.92 − .631 = ________

7. 35 − .09 = ________

8. 153 − 2.19 = ________

9. 515.2 − .9 = ________

10. 2.611 − 1.091 = ________

11. 3.33 − 3.31 = ________

12. 94.45 − 43.4 = ________

13. .007 − .001 = ________

14. .191 − .019 = ________

Activity Sheet

☞ **Directions:** Subtract.

1. 19.005 – 14.5 = ________

2. 94.78 – 15 = ________

3. 92.15 – 84.7 = ________

4. 75.16 – 52.8 = ________

5. 8.14 – 6.1 = ________

6. 1.354 – .265 = ________

7. 1.52 – .408 = ________

8. 1.9 – .0674 = ________

9. 8.09 – 4.256 = ________

10. 6.2 – 4.5775 = ________

11. 12.5 – 7.75 = ________

12. 7.05 – 3.135 = ________

13. 15.065 – 9.466 = ________

14. 7.74 – 6.63 = ________

15. 5.489 – 2.631 = ________

16. 824.9 – 416.9 = ________

17. 527.2 – 404.8 = ________

18. 487.9 – 126.5 = ________

19. 921.1 – .301 = ________

20. 12 – 1.98 = ________

Word Problems

Directions: Use the steps on page 18 or 33 to solve the problems. Show your work. Write each answer on the line.

1. In ticket sales, the basketball team sold $128.57 to teachers and $459.63 to students. What was the total amount of ticket sales?
2. When Dan's father went to the store and bought meat it cost him $5.76. Vegetables cost him $1.59, fruit $.89, and dairy items $7.88. How much was his bill?
3. Mike had a checkbook balance of $1,359.00. He deposited $599.33. What is his new balance?
4. The Daycare Center in Pierson took in the following amounts: $324.12 on Monday; $412.15 on Tuesday; $222.13 on Wednesday; $516.17 on Thursday; and $325.75 on Friday. What was the total income for the week?
5. Kenny had $25.00. He spent $2.50 on a pair of socks, and $14.00 on a shirt. How much did he have left?
6. After two days driving Steve had only 1169.3 miles remaining of a 3,425 mile trip. How many miles has he already traveled?
7. Larry had a checkbook balance of $356.89, before writing checks for $6.10 and $37.77. What is his new balance?
8. Jeff's gas tank in his car holds 26 gallons of gas. On one occasion he filled it with 14.2 gallons of gas. How much gas was in the tank before filling it?

Section 3

What This Section is About...

In this section you will practice multiplying decimal numbers. Decimal numbers are natural numbers or integers such as 0, 1, 2, 3.... You will also multiply decimals by powers of ten.

MULTIPLICATION

Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Multiplying decimal numbers 2. Multiplying decimal numbers by powers of ten	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concepts: **Multiplying Decimal Numbers**

?

How do you multiply decimal numbers?

Example 1: Multiply: 3.25 x 4.5 =

Step 1: Rewrite the problem in vertical form.

$$\begin{array}{r} 3.25 \\ \times\ 4.5 \\ \hline \end{array}$$

Step 2: Multiply. Disregard decimal points.

$$\begin{array}{r} 3.25 \\ \times\ 4.5 \\ \hline 1625 \\ 1300 \\ \hline 14625 \end{array}$$

Step 3: Count the number of decimal places in both numbers.

$$\begin{array}{rcl} 3.25 & \longleftarrow & 2 \text{ places} \\ \times\ 4.5 & \longleftarrow & 1 \text{ place} \\ \cline{1-1} \cline{3-3} 1625 & & 3 \text{ places} \\ 1300 & & \\ \cline{1-1} 14.625 & & \end{array}$$

Step 4: Count, starting from the ones' place (right), the same number of decimal places in the product. Place the decimal point.

$$\begin{array}{rl} 3.25 & \\ \times\ 4.5 & \\ \cline{1-1} 1625 & \\ 1300 & \\ \cline{1-1} 14.\underbrace{625}_{} & 3 \text{ places} \end{array}$$

Example 2:

$$\begin{array}{r} .05 \\ \times .09 \\ \hline \end{array}$$

Step 1: Write in vertical form, if necessary.

Step 2: Multiply. Disregard decimal points.

$$\begin{array}{r} .05 \\ \times .09 \\ \hline 45 \\ 00 \\ \hline 045 \end{array}$$

Step 3: Count the number of decimals in both numbers.

$$\begin{array}{rcr} .05 & \qquad & 2 \text{ places} \longleftarrow \\ \times .09 & & + \; 2 \text{ places} \longleftarrow \\ \cline{1-1} \cline{3-3} & & 4 \text{ places} \end{array}$$

Step 4: Count starting from the right or ones' place, the same number of decimal places in the product. Place the decimal point. Annex zeroes to left, if needed.

$$\begin{array}{r} .05 \\ \times .09 \\ \hline 45 \\ 00 \\ \hline .0045 \end{array}$$

Solution: $\underset{\longleftarrow}{.0045}$ 4 places

Concepts:

Multiplying Decimal Numbers by Powers of Ten

?

How do you multiply decimal numbers by powers of ten?

Example 1: Multiply: 5.45 x 10

Step 1: When multiplying a decimal number by *ten*, move the decimal point *one* place to the right.

5.45 x 10 = 54.5

Example 2: Multiply: 3.7 x 100 =

Step 1: When multiplying a decimal number by *one hundred*, move the decimal *two* places to the *right*. (When multiplying by powers of ten, annex zeroes as needed for place holders.)

3.7 x 100 = 37**0**

(Note that the decimal point does not need to be printed since you now have a whole number.)

Example 3: Multiply: 1000 x 43.5972

Step 1: When multiplying a decimal by *one thousand*, move the decimal point *three* places to the right.

1000 x 43.5972 = 43,597.2

Quiz

Directions: Multiply.

1. $$\begin{array}{r} .3 \\ \times\ 8 \\ \hline \end{array}$$

2. $$\begin{array}{r} .03 \\ \times\ 2 \\ \hline \end{array}$$

3. $$\begin{array}{r} .58 \\ \times\ .6 \\ \hline \end{array}$$

4. $$\begin{array}{r} 1.47 \\ \times\ .03 \\ \hline \end{array}$$

5. $$\begin{array}{r} 3.351 \\ \times\ 86 \\ \hline \end{array}$$

6. $$\begin{array}{r} 16.2 \\ \times\ .05 \\ \hline \end{array}$$

7. .12 x .05 = ____________

8. $ .25 x 8 = ____________

9. 3.68 x .06 = ____________

10. $15.38 x $2.00 = ____________

Activity Sheet

☞ **Directions**: Count the number of digits to the right of the decimal point. Write the number and name on each line.

1. 36.5 ____1____ ____tenths____
2. 89.48 ____2____ ____hundreths____
3. 398.06 __________ __________
4. 950.5 __________ __________
5. 429.62 __________ __________
6. 522.33 __________ __________
7. 619.58 __________ __________
8. 49.99 __________ __________
9. 526.09 __________ __________
10. 88.8 __________ __________
11. 16.24 __________ __________
12. 896.3 __________ __________
13. 14.6 __________ __________
14. 196.84 __________ __________
15. 999.52 __________ __________
16. 428.12 __________ __________
17. 13.5 __________ __________
18. 192.6 __________ __________
19. 14.89 __________ __________
20. 222.51 __________ __________

Activity Sheet

Directions: Multiply.

1. 4 x .1

2. 12 x .8

3. .9 x .6

4. .23 x 9

5. 84 x .42

6. .98 x 18

7. 39 x .61

8. 4.56 x 34

9. 7 x .56

10. 18 x .2

11. 0.06 x 3

12. .05 x 17

13. .07 x 38

14. 25 x .4

15. 6 x .35

Activity Sheet

☞ **Directons:** Multiply.

1. 361.5
x 2.3

2. 59.6 x 42.8 = ____________

3. 96. 5
x 2. 43

4. 1.3 x 498.5 = ____________

5. 98.6
x 3.49

6. 3. 98 x 8.52 = ____________

7. 42.5
x 34.9

8. 89. 3 x 29. 5 = ____________

9. 98.3
x 21.1

10. 5.6 x 91.34 = ____________

Activity Sheet

Directions: Multiply.

1. 3.6 x 7 = __________

2. 460
x 4.8

3. 56.17
x 75

4. 5 x .71 = __________

5. 6 x .005 = __________

6. .01 x .005 = __________

7. 2.14
x .03

8. .09
x 3.1

9. 12.52
x .06

10. 1.15
x .52

11. $ .42 x 4 = __________

12. $ .80 x 7 = __________

13. $4.25 x 14 = __________

14. .75
x .06

15. $10.50
x 60

16. 8.1
x .18

Activity Sheet

☞ **Directions:** Find the products.

1. 8.6 x 10 = ______________

2. 6.07 x 2 = ______________

3. 4.8
x 6.3

4. .04 x 5.1 = ______________

5. 3.141 x .92 = ______________

6. 66.9
x 4.7

7. 27.18
x .96

8. 65.9
x 4.7

9. 8.28
x 11.82

10. 18.33
x 4.6

Section 4

What This Section is About...

In this section you will practice dividing decimal numbers with no more than two decimal places by divisors less than 100. You will also divide decimal numbers by powers of ten.

Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Dividing decimal numbers 2. Dividing decimal numbers by powers of ten	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: Dividing Decimal Numbers

?

How do you divide decimal numbers?

Example 1: Divide $2.1\,\overline{)\,.63}$

Step 1: Make the divisor a whole number by moving the decimal point as many places to the right as needed.

Step 2: The decimal in the dividend must be moved the same number of places to the right. Place the decimal point in the quotient directly above its new placement in the dividend.

$$2.\underset{\smile}{1.}\,\overline{)\,.\underset{\smile}{6.}\overset{}{3}}$$

Step 3: Divide:

$$\begin{array}{r}
.3\\
21.\overline{)\,6.3}\\
\underline{6.3}\\
0
\end{array}$$

Solution: .3

Concept: Dividing Decimals by Powers of Ten

?

How do you divide decimals by powers of ten?

Example: $10\,\overline{)\,3.46}$ $100\,\overline{)\,104.3}$ $1000\,\overline{)\,20.34}$

Step 1: When dividing a decimal number by *ten*, move the decimal point *one* place to the *left*.
(Example: $3.46 \div 10 = 0.346$)

Step 2: When dividing a decimal number by *one hundred*, move the decimal point *two* places to the *left*.
(Example: $104.3 \div 100 = 1.043$)

Step 3: When dividing a decimal number by *one thousand*, move the decimal point *three* places to the *left*.
(Example: $20.34 \div 1000 = .02034$)

Quiz

Directions: Find the quotient.

1. $4\overline{)9.2}$

2. $7\overline{)8.96}$

3. $20\overline{)4}$

4. $36\overline{)91.44}$

5. $.6\overline{)12}$

6. $.8\overline{).896}$

7. $.16\overline{)48}$

8. $.014\overline{)112}$

9. $1.5 \div .30 =$ ________

10. $.39\overline{)265.2}$

Vocabulary

Directions: Study the vocabulary words below.

bar — a repeating decimal may be written using a bar over the portion which repeats

Example: $.3333 = 0.\overline{3}$ $7.5212121 = 7.5\overline{21}$

non-repeating — a decimal which continues without end and has no pattern of repetiition

Example: 3.1415927359...

quotient — the result of division; the answer

repeating decimal — a decimal numeral which has a repeating pattern of digits without end

Example: 0.3333..., 7.5212121...,
0.543254325432...

terminating decimal — a decimal numeral which ends or does not repeat

Example: 3.14, 0.5963 and 5.2

Activity Sheet

Directions: Find the quotients.

1. $2\overline{)64.8}$
2. $7\overline{)92.4}$
3. $0.4\overline{)42.8}$
4. $10\overline{)10.24}$
5. $0.08\overline{)3.60}$
6. $0.6\overline{)45.0}$
7. $43\overline{)150.5}$
8. $23\overline{)7.89}$
9. $92\overline{)3.404}$
10. $.25\overline{)15.625}$

Activity Sheet

☞ **Directions:** Find the quotients.

1. $.05\overline{)\,1.9}$

2. $.21\overline{)\,12.6}$

3. $8\overline{)\,564}$

4. $3.7\overline{)\,925}$

5. $.9\overline{)\,7029}$

6. $6.1\overline{)\,2.44}$

7. $72.9 \div .81 =$ ________

8. $.133 \div 1.9 =$ ________

9. $.8 \div .02 =$ ________

10. $81 \div 1.5 =$ ________

Activity Sheet

☞ **Directions:** Divide.

1. $4\overline{)72}$
2. $.7\overline{)357}$
3. $.3\overline{)1.11}$
4. $.03\overline{)54}$
5. $.05\overline{)85}$
6. $.022\overline{)6}$
7. $.08\overline{)296}$
8. $.04\overline{)9.6}$
9. $.4\overline{)7.2}$
10. $.07\overline{)2.52}$
11. $.04\overline{).068}$
12. $.09\overline{)6.3}$
13. $.6\overline{)4.2}$
14. $.002\overline{).4}$
15. $.3\overline{)75}$
16. $.03\overline{)4.2}$
17. $.07\overline{)14}$
18. $.18\overline{).828}$
19. $.53\overline{).636}$
20. $.37\overline{).1739}$

Activity Sheet

Directions: Divide using the shortcut method.

1. 305.1 ÷ 10 = ____________

2. 35.64 ÷ 100 = ____________

3. 385.4 ÷ 1000 = ____________

4. 4981.2 ÷ 1000 = ____________

5. 4111.33 ÷ 100 = ____________

6. 85 ÷ 100 = ____________

7. 85 ÷ 1000 = ____________

8. 2.46 ÷ 1000 = ____________

9. 39.929 ÷ 10 = ____________

10. 543.21 ÷ 10 = ____________

Activity Sheet

☞ **Directions**: Find the quotients.

1. 621.1 ÷ 100 = ____________

2. 84.6 ÷ 1000 = ____________

3. 63.4 ÷ 10 = ____________

4. 395.2 ÷ 100 = ____________

5. 35.64 ÷ 1000 = ____________

6. 1082.9 ÷ 10 = ____________

7. 54.25 ÷ 100 = ____________

8. 810.29 ÷ 100 = ____________

9. 8.41 ÷ 1000 = ____________

10. 1.67 ÷ 10 = ____________

Word Problems

☞ **Directions**: Use the steps on page 53 or 71 to solve the problems below.

1. Find the cost of the following:

   a. 5 lb of onions at 26¢ per pound a. ________________

   b. 3 dozen eggs at $ .89 a dozen b. ________________

2. What would the cost per year be if the phone service costs $26.92 per month?

   ____

3. A plane on a flight used 43.8 gal per hour. If the flight lasted 4.5 hours, how many gallons of gasoline were used?

   ____

4. Allen bought 3 lb of candy at 29¢ per pound; Darrell bought 2 lb of candy at 79¢ per pound; Cara bought 5 lb at 39¢ per pound. What was the total cost of the candy?

   ____

5. At 33¢ per pound, how many pounds of peaches can you buy for $1.65?

   ____

6. If a dozen pencils costs $4.32, what will one pencil cost?

   ____

7. An airplane flies 858.2 miles in 2.8 hours. What is the average speed?

   ____

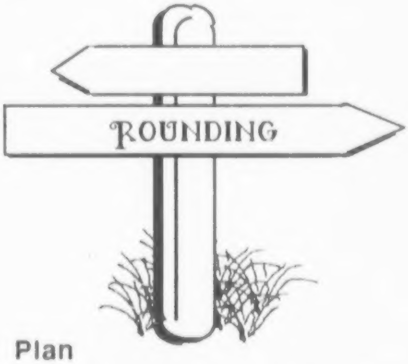
8. If a wire that is .75 of an inch long is to be cut into sections that are each .04 inch long, how many sections can it be cut into? (Round to the nearest whole number.)

   ____

Section 5

What This Section is About...

In this section you will practice rounding decimal numbers less than 100 with no more than three decimal places.



Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? • Rounding decimal numbers	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Rounding Decimal Numbers**

?

How do you round decimal numbers?

Example 1: Round 25.864 to the nearest tenth.

Step 1: Locate place to be rounded—tenths'. Draw a line under the digit in the tenths' place.

$$25.\underline{8}64$$

Step 2: Circle the digit to the right of the digit that was underlined in Step 1.

$$25.\underline{8}\textcircled{6}4$$

If this digit is *5 or larger*, increase the number in the tenths' place by 1. If the digit is *4 or less*, leave the digit in the tenths' place the same.

Step 3: In this problem, the digit that is circled is a **6**. Six (6) is larger than 5, so the digit in the tenths' place is increased by one.

$$\begin{array}{r} 25.864 \\ +\quad\;\; 1 \\ \hline 25.964 \end{array}$$

Step 4: Discard all digits to the right of the tenths' place.

25.9~~64~~ → 25.9

Solution: 25 . 864 rounded to the nearest tenth is 25 . 9.

Example 2: Round 79.637 to the nearest whole number.

Step 1: Draw a line under the digit in the whole number place. (This is the units' or ones' place.)

$$7\underline{9}.637$$

Step 2: Circle the digit to the right of the digit underlined in Step 1.

$$7\underline{9}\textcircled{6}37$$

Step 3: In this problem, the digit circled is a 6. Six is larger than 5, so you add 1 to the whole number place.

$$\begin{array}{r} 79.637 \\ +\quad 1 \\ \hline 80.637 \end{array}$$

Step 4: Drop all the digits to the right of the whole number place.

$$\overrightarrow{80}.\cancel{637}$$

Solution: 79.637 rounded to the nearest whole number is 80.

Quiz

Directions: Round to the designated place.

1. Round **3.722** to the nearest ***hundredth***. ________________

2. Round **4.38** to the nearest ***tenth***. ________________

3. Round **36.5** to the nearest ***whole number***. ________________

4. Round **398.4** to the nearest ***tenth.*** ________________

5. Round **23.75** to the nearest ***whole number.*** ________________

Activity Sheet

☞ **Directions**: Round to the designated place.

1. Round **16.46** to the nearest ***tenth.*** ____________________

2. Round **146.984** to the nearest ***hundredth***. ____________________

3. Round **6.842** to the nearest ***tenth***. ____________________

4. Round **72.697** to the nearest ***tenth***. ____________________

5. Round **2.478** to the nearest ***hundredth.*** ____________________

6. Round **367.87** to the nearest ***hundredth.*** ____________________

7. Round **34.57** to the nearest ***tenth***. ____________________

8. Round **54.078** to the nearest ***hundredth.*** ____________________

9. Round **6.428** to the nearest ***tenth***. ____________________

10. Round **84.412** to the nearest ***hundredth.*** ____________________

Activity Sheet

Directions: Round.

1. Round **6.84** to the nearest ***tenth.*** ______________

2. Round **47.26** to the nearest ***whole number.*** ______________

3. Round **68.353** to the nearest ***tenth.*** ______________

4. Round **8.463** to the nearest ***hundredth.*** ______________

5. Round **69.437** to the nearest ***tenth.*** ______________

6. Round **52.473** to the nearest ***tenth.*** ______________

7. Round **68.473** to the nearest ***hundredth***. ______________

8. Round **2.783** to the nearest ***whole number***. ______________

9. Round **36.427** to the nearest ***tenth***. ______________

10. Round **75.423** to the nearest ***whole number.*** ______________

UNIT 4: PERCENT

Section 1: Equivalent Forms

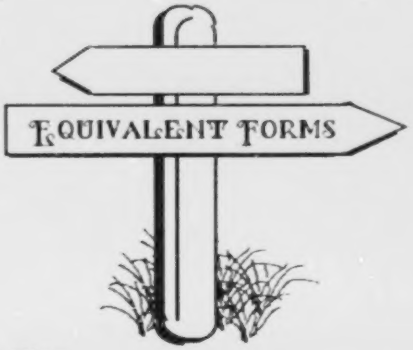
Section 2: Percents of Whole Numbers

Section 3: Percents of Decimal Numbers

Section 1

What This Section is About...

In this section you will practice skills needed for mathematical operations with percents.



Suggested Plan

Checkpoints	Activities
✓ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✓ What concepts will be presented? 1. Write a fraction as an equivalent decimal 2. Write a decimal as a percent 3. Write a decimal as an equivalent fraction 4. Write a percent as a fraction	✍ See examples on the following pages.
✓ How much do I already know?	✍ Take Quiz as pretest.
✓ What vocabulary words are introduced?	✍ See Vocabulary.
✓ What practice is provided?	✍ Do Activity Sheets.
✓ What if I need extra help?	✍ Refer to examples in this section.
✓ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: Write a Fraction as an Equivalent Decimal

?

How do you write a fraction as an equivalent decimal?

Example: Write $5\frac{2}{3}$ in decimal form.

When you wish to rename a mixed fraction as a decimal, compute only the fractional part.

Step 1: Divide the numerator by the denominator. (Set aside the whole number part.)

$$5\frac{2}{3} \qquad \begin{array}{r} .6666 \\ 3\,\overline{)\,2.0} \\ \underline{1\,8} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 20 \end{array}$$

Step 2: Round the quotient to the nearest thousandth.

$.6\overline{666}$ is a repeating decimal.

.6666 rounds to .667

Step 3: Remember to write the decimal part *and* the whole number. The decimal equivalent is **5.667.**

Concept: Write a Decimal as a Percent

?

How do you write a decimal as a percent?

Example: Write 2.667 as a percent.

Step 1: Move the decimal two places to the right.

$$2.667 \qquad \underset{\smile}{266.7}$$

Step 2: Write the percent symbol (%) to the right of the number.

Solution: 266.7%

Concept: **Write a Decimal as an Equivalent Fraction**

?

How do you write a decimal as an equivalent fraction?

Example: Write .75 as a fraction.

Step 1: Determine the place value of the last digit in the decimal. This will determine the fraction's denominator.

.75 **5** is in the **hundredths'** place

Step 2: Write the numbers to the right of the decimal as the numerator. Write the place value of the last digit as denominator.

$$\frac{\quad}{100} \rightarrow \frac{75}{100}$$

Step 3: Simplify.

$$\frac{75}{100} = \frac{3}{4}$$

Concept: **Write a Percent as a Fraction**

?

How do you write a percent as a fraction?

Example: Write 47% as a fraction.

Step 1: Determine the decimal by moving the decimal point 2 places to the left.

$$47\% = \underset{\smile}{.47}$$

Step 2: Determine place value of last digit to right of decimal.

.47 **7** is in the **hundredths'** place, so the denominator will be 100.

Step 3: Write the numbers to the right of the decimal point as the numerator of the fraction and the place value of the last digit as the denominator.

$$.47 = \frac{47}{100}$$

Step 4: Simplify.

$\frac{47}{100}$ is in lowest terms.

Quiz

Directions: Complete the following chart by writing equivalent forms.

	Fraction	Decimal	Percent
1.	$\frac{1}{2}$		
2	$\frac{1}{5}$		
3.	$\frac{2}{3}$		
4.	$\frac{3}{4}$		
5.	$\frac{1}{3}$		
6.	$2\frac{1}{10}$		
7.	$2\frac{2}{3}$		
8.	$1\frac{1}{4}$		
9.	$\frac{4}{5}$		
10.	$\frac{5}{8}$		

Vocabulary

☞ **Directions:** Study the words and the chart below.

percent — per hundred; symbol: %

decimal — a fraction whose denominator is ten or a multiple of ten; expressed as a decimal by placing a decimal point to the left of the numerator

Examples: $\frac{2}{10} = .2$ $\frac{15}{100} = .15$

decimal point — a period placed before a fraction expressed in decimal figures

Examples: 2.03; .25

is — equal to

ratio — a comparison of two numbers, frequently expressed as a fraction

Common Equivalents

$\frac{1}{4} = 25\%$

$\frac{1}{2} = 50\%$

$\frac{3}{4} = 75\%$

$\frac{1}{3} = 33\frac{1}{3}\%$

$\frac{2}{3} = 66\frac{2}{3}\%$

$\frac{1}{5} = 20\%$

$\frac{2}{5} = 40\%$

$\frac{3}{5} = 60\%$

$\frac{4}{5} = 80\%$

Activity Sheet

Directions: Match the fraction to its equivalent percent.
Put the correct letter in each blank.

______	1. $\frac{2}{5}$	A.	50%
______	2. $\frac{1}{2}$	B.	$33\frac{1}{3}\%$
______	3. $\frac{3}{4}$	C.	40%
______	4. $\frac{1}{5}$	D.	20%
______	5. $\frac{1}{3}$	E.	80%
______	6. $\frac{4}{5}$	F.	25%
______	7. $\frac{3}{5}$	G.	75%
______	8. $\frac{1}{4}$	H.	$66\frac{2}{3}\%$
______	9. $\frac{2}{3}$	I.	60%

Activity Sheet

Directions: Write each fraction as a decimal.

1. $\frac{1}{2}$ = $\overline{)\quad\quad}$

2. $\frac{1}{5}$ = $\overline{)\quad\quad}$

3. $\frac{2}{5}$ = $\overline{)\quad\quad}$

4. $\frac{3}{5}$ = $\overline{)\quad\quad}$

5. $\frac{4}{5}$ = $\overline{)\quad\quad}$

6. $\frac{3}{20}$ = $\overline{)\quad\quad}$

7. $\frac{7}{20}$ = $\overline{)\quad\quad}$

8. $\frac{1}{4}$ = $\overline{)\quad\quad}$

9. $\frac{7}{50}$ = $\overline{)\quad\quad}$

10. $\frac{1}{25}$ = $\overline{)\quad\quad}$

Activity Sheet

☞ **Directions:** Write each fraction with a denominator of 10 or 100; then, write as a decimal.

1. $\frac{2}{5}$ = _____ = _____

2. $\frac{1}{10}$ = _____ = _____

3. $\frac{2}{4}$ = _____ = _____

4. $\frac{1}{25}$ = _____ = _____

5. $\frac{3}{5}$ = _____ = _____

6. $\frac{4}{5}$ = _____ = _____

7. $\frac{3}{4}$ = _____ = _____

8. $\frac{1}{20}$ = _____ = _____

9. $\frac{13}{20}$ = _____ = _____

10. $\frac{6}{20}$ = _____ = _____

Activity Sheet

☞ **Directions:** Write each fraction as a decimal and then as a percent.

	Fraction	Decimal	Percent
1.	$\frac{1}{2}$		
2	$\frac{1}{4}$		
3.	$\frac{3}{4}$		
4.	$\frac{89}{100}$		
5.	$\frac{80}{100}$		
6.	$\frac{2}{5}$		
7.	$\frac{1}{3}$		
8.	$\frac{3}{25}$		
9.	$\frac{7}{20}$		
10.	$\frac{23}{50}$		

Activity Sheet

Directions: Write each fraction or mixed number as a decimal and then as a percent.

	Fraction	Decimal	Percent
1.	$2\frac{5}{20}$		
2	$3\frac{1}{5}$		
3.	$\frac{5}{25}$		
4.	$2\frac{3}{4}$		
5.	$1\frac{5}{8}$		
6.	$1\frac{3}{4}$		
7.	$\frac{1}{50}$		
8.	$2\frac{1}{10}$		
9.	$\frac{1}{5}$		
10.	$6\frac{2}{3}$		

Activity Sheet

☞ **Directions**: Complete the chart.

	Fraction	Decimal	Percent
1.	$\frac{1}{4}$		
2		3.75	
3.			45%
4.		.20	
5.	$\frac{2}{3}$		
6.			$33\frac{1}{3}\%$
7.		6.25	
8.		.25	
9.	$\frac{3}{4}$		
10.			60%

Section 2

What This Section is About...

In this section you will practice mathematical operations with percents of whole numbers.

WHOLE NUMBERS

Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? • Find a percent of a whole number	✍ See example on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to example in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Finding a Percent of a Whole Number**

?

How do you find a percent of a whole number?

Example: Find 35% of 27

Step 1: Change the percent to a decimal.

$$35\% = .35$$

Step 2: Replace **of** with a multiplication sign.

$$.35 \boxed{x} 27 =$$

Step 3: Rewrite in vertical form.

$$\begin{array}{r} .35 \\ \underline{x\ \ 27} \end{array}$$

Step 4: Multiply and write decimal i product.

$$\begin{array}{r} .35 \\ \underline{x\ \ 27} \\ 245 \\ \underline{70\ } \\ 9.45 \\ \uparrow\ \ \end{array}$$

Quiz

☞ **Directions**: Find the following percents.

1. 18% of 46 = ______

2. 6% of 24 = ______

3. 25% of 36 = ______

4. 78% of 300 = ______

5. 5% of 29 = ______

6. 23% of 64 = ______

7. 60% of 175 = ______

8. 3% of 40 = ______

9. 45% of 650 = ______

10. 150% of 8 = ______

Activity Sheet

Directions: Find the following percents.

1. 24% of 52 = ________
2. 2% of 18 = ________
3. 2% of 36 = ________
4. 14% of 80 = ________
5. 5% of 84 = ________
6. 16% of 240 = ________
7. 9% of 50 = ________
8. 6% of 325 = ________
9. 45% of 819 = ________
10. 10% of 30 = ________

Activity Sheet

Directions: Find the following percents.

1. 4% of 50 = ________

2. 2% of 94 = ________

3. 10% of 90 = ________

4. 4% of 39.8 = ________

5. 8% of 84 = ________

6. 25% of 16 = ________

7. 12% of 48 = ________

8. 6% of 7.5 = ________

9. 3% of 1.26 = ________

10. 10% of 12 = ________

Activity Sheet

Directions: Solve the problems.

1. 10% of 30 = ________

2. 50% of 62 = ________

3. 40% of 65 = ________

4. 75% of 92 = ________

5. 12% of 800 = ________

6. 16% of 804 = ________

7. 60% of 200 = ________

8. 25% of 328 = ________

9. 20% of 735 = ________

10. 18% of 800 = ________

Word Problems

☞ **Directions**: Solve, using the steps on page 20.

1. Amanda had 90% of her test questions correct. There were 40 questions in all. How many did she have correct? __________

2. Of 45 seats on the bus, 60% are filled. How many seats are filled? __________

3. Mr. Jones' car gets 15.6 miles per gallon. With a tune-up his mileage will increase 15%. How many miles per gallon will he get after a tune-up? __________

4. Last season a Wildcat baseball player hit 48 home runs. This season he has hit 30. What percent is the number of home runs he has hit this season to the number he hit last season? (Round to the nearest whole number.) __________

5. Judy can throw a baseball 240 feet. This is 80% as far as her brother can throw. How far can her brother throw the ball? __________

6. A mailman delivered 171 of 180 letters to houses on his mail route. He delivered mail to what percent of the houses? __________

7. If Thongkham received 3/5 of all the votes in an election, what percent of the votes did he get? __________

8. If the sales tax is 5%, what would be the sales tax on a purchase of $8.50? __________

9. Mr. Walker bought a camera at a 15% discount. The regular price was $156.00. What was the total amount that he paid, using the discount? __________

10. Martha put furniture in storage. The charge was 3% of the furniture's value. If the furniture was valued at $750.00, how much did she pay? __________

11. How much interest will Joe earn in 5 years on a $2400 investment paying 7% simple interest per year? (Note: Interest = Principal x Rate x Time.) __________

12. Tom borrowed $1800 from the bank to buy a car. He took a loan at 8% simple interest for 3 years. Find the total amount of interest. __________

Section 3

What This Section is About...

In this section you will practice mathematical operations with percents. You will find percents of decimal numbers using skills you learned in previous lessons.

Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? • Find a percent of two-place decimal numbers	✍ See example on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Percents of Decimal Numbers**

?

How do you write a percent as a decimal number?

Example: 73% of 52.25 is ____________.

Step 1: Write the percent as either a fractional or decimal equivalent.

$$73\% = .73$$

Step 2: Replace the word ***of*** with a multiplication sign and ***is*** with an equals sign.

$$.73 \times 52.25 =$$

Step 3: Multiply. (Place number with more digits on top.)

$$\begin{array}{r} 52.25 \\ \underline{\times \quad .73} \\ 15675 \\ \underline{36575} \\ 381425 \end{array}$$

Step 4: Place the decimal point correctly. 38.1425

←

Quiz

Directions: Solve the problems.

1. 45% of 2.36 = ________

2. 90% of .75 = ________

3. 5% of 27.95 = ________

4. 36% of .25 = ________

5. 4% of 3.2 = ________

Activity Sheet

Directions: Find the given percentage of the following decimal numbers.

1. 23% of .80 = ________

2 59% of .8 = ________

3. 78% of 5.5 = ________

4. 75% of .84 = ________

5. 17% of 8.2 = ________

6. 62% of .19 = ________

7. 8% of 2.4 = ________

8. 33% of .14 = ________

9. 25% of .96 = ________

10. 28% of 5.9 = ________

Activity Sheet

Directions: Find the given percentage of the following decimal numbers.

1. 7% of 3.68 = ________

2. 22% of 12.24 = ________

3. 67% of 81.6 = ________

4. 60% of 2.39 = ________

5. 9% of 64.2 = ________

6. 10% of 25.50 = ________

7. 20% of 50.25 = ________

8. 5% of 19.99 = ________

9. 30% of 4.07 = ________

10. 6% of 8.6 = ________

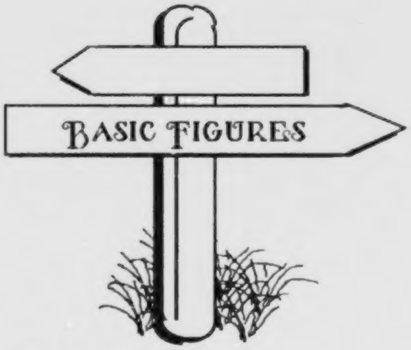
UNIT 5: GEOMETRY

Section 1: Basic Figures
Section 2: Angles and Triangles
Section 3: Polygons

Section 1

What This Section is About...

In this section you will learn how to identify basic geometric figures called points, rays, lines, line segments, and angles. You will identify both parallel and perpendicular lines.



Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? • Identify basic geometric figures—points, rays, line segments, lines, angles, parallel lines and perpendicular lines	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: Identify Points

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What is a point?

Example: This dot stands for point A •

a. A point is not a dot.
b. A dot stands for an exact location in space.
c. A point has no dimensions, that is, no size, height, width, or length.
d. A point cannot be measured.
e. The purpose of a point is to determine a place.
f. A point is designated by a capital letter.

Concept: Identify Lines

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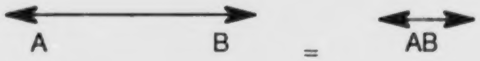
What is a line?

Example: Line



a. A line is a concept.
b. A line is a collection of points. Between any two points is an infinite number of points.
c. A line extends indefinitely in opposite directions.
d. A line is named by identifying any two of its points.
e. A line is represented with arrows on both ends.
f. A name of a line is written using two points of the line with a "line" drawn above.

Concept: **Identify Line Segments**

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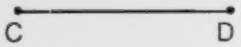
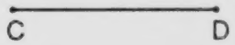
What is a line segment?

Example: Line Segment



This line segment is marked by endpoints C and D.

 = $\overline{CD}$

a. A line segment is the measurable part of a line.
b. Line segments have endpoints that show where they begin and end.
c. Line segments are named by identifying the endpoints.
d. A line segment has one dimension—length.
e. A line segment is named by writing the endpoints with a short segment above them.

Concept: **Identify Rays**

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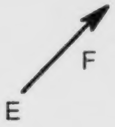
What is a ray?

Example: Ray

 = $\overrightarrow{EF}$

a. A ray is a part of a line.
b. A ray has only one endpoint.
c. A ray starts at the endpoint and goes on indefinitely in one direction.
d. A ray is named by identifying its endpoint and a second point to show direction, and a short ray drawn with its endpoint over the letter representing the endpoint.

$\overleftarrow{EF}$ is not the same as $\overrightarrow{EF}$

Concept: **Identify Angles**

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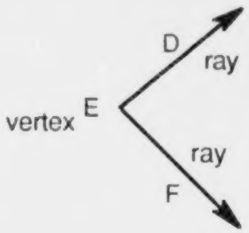
What is an angle?

Example: Angle



∠DEF

a. An angle is formed by two different rays that share a common endpoint.
b. The endpoint is called the vertex.
c. An angle's two rays go on indefinitely.
d. An angle is identified by identifying a point on one ray, the vertex, and a point on the other ray. The middle letter is always the vertex.

Angle DEF; < DEF

Concept: Identify Perpendicular Lines

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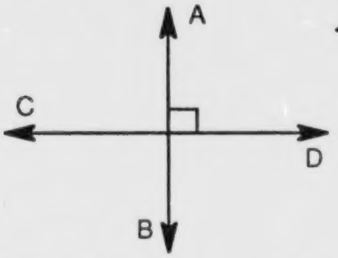
What is a perpendicular line?

Example: Perpendicular Lines



$\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$

a. Perpendicular lines intersect in exactly one point.
b. The angles formed each measure 90°.

c. $\overleftrightarrow{AB}$ is perpendicular to $\overleftrightarrow{CD}$.

Concept: Identify Parallel Lines

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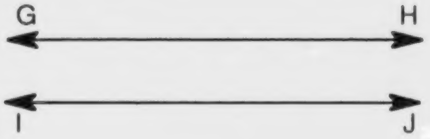
What is a parallel line?

Example: Parallel Line



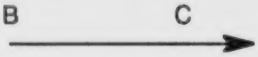
$\overleftrightarrow{GH} \parallel \overleftrightarrow{IJ}$

a. Parallel lines never intersect.
b. The perpendicular distance between the lines will always be the same.
c. $\overleftrightarrow{GH}$ is parallel to $\overleftrightarrow{IJ}$ $\qquad \overleftrightarrow{GH} \parallel \overleftrightarrow{IJ}$

Quiz

Directions: Write the name of each figure in the blank beside the figure.

1.



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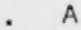

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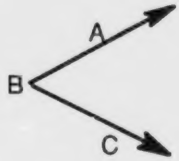
3.



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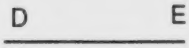

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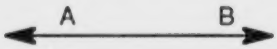

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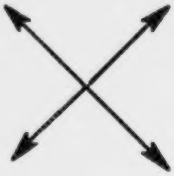
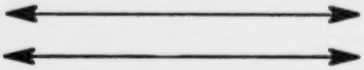
Quiz

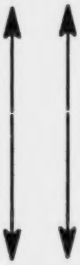
Directions: Identify the type of lines by name. Choose either *parallel* or *perpendicular*. Write the name on the blank provided.



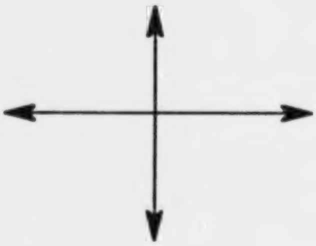
1. ____________________



2. ____________________



3. ____________________

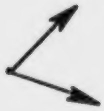


4. ____________________

Vocabulary

Directions: Study the terms below.

angle — two rays that share a common endpoint Symbol:



concept — an idea

dimensions — the size of the parts of a figure

horizontal lines — lines that go across or side to side

intersecting lines — lines that have a common point

line — a collection of points that extend to infinity in opposite directions

Symbol: ↔

line segment — part of a line between and including its end points

Symbol: ——

parallel lines — lines that are always the same distance apart and never meet

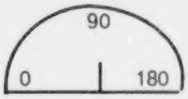
═

perpendicular lines — lines that intersect at right angles

⊥

point — smallest particle of space, having no size and too small to see. A dot (.) is used to represent a point.

protractor — a tool for measuring and drawing the angles



ray — begins at a point (.) and extends to infinity in one direction

Symbol: →

vertical lines — lines that go up and down

Vocabulary Activity

Directions: Name each of the following, using a vocabulary word.

1.

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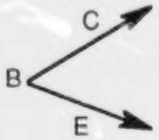
2. 

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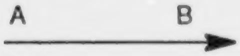
3. 

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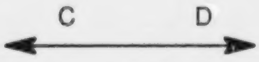
4. 

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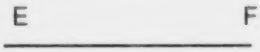
5. 

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Vocabulary Activity

Directions: Name each of the following, using a vocabulary word.

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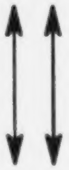
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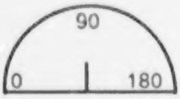

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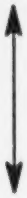
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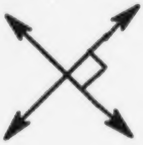
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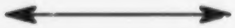
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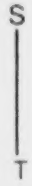
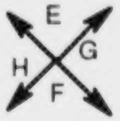
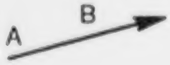
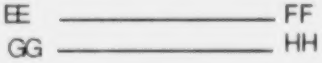
Activity Sheet

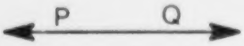
Directions: Study the figures below and identify them using symbols.

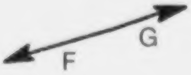


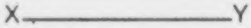












1. horizontal line segment ____________

2. vertical line segment ____________

3. perpendicular lines ____________ and ____________

4. parallel line segments ____________ and ____________

5. ray ____________

6. line ____________ and ____________

Directions: Draw and label.

1. $\overleftrightarrow{AB}$ parallel to $\overleftrightarrow{CD}$

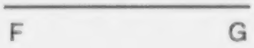
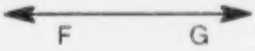
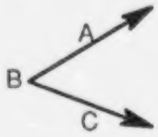
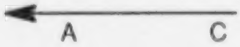
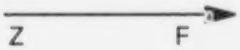
2. horizontal $\overline{GH}$

3. vertical $\overrightarrow{EF}$

4. $\overleftrightarrow{IJ}$ perpendicular to $\overleftrightarrow{LM}$

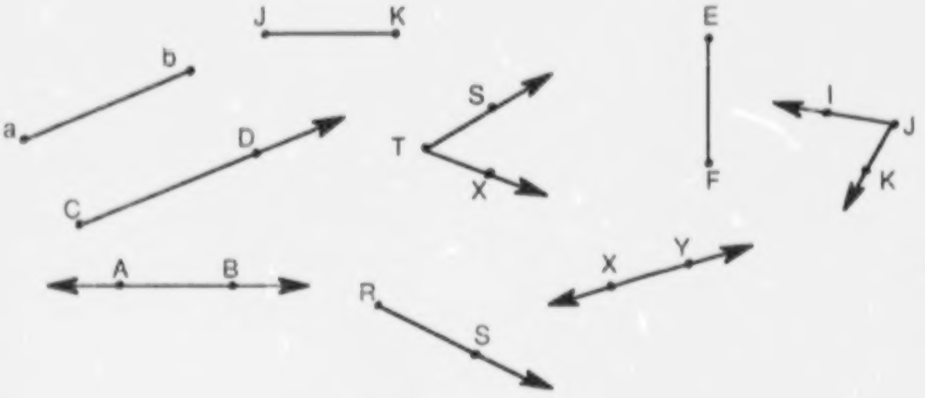
Activity Sheet

Directions: Name the following figures in words, and write the symbols.

		In Words	In Symbols
1.		____________	____________
2.		____________	____________
3.		____________	____________
4.		____________	____________
5.		____________	____________

Activity Sheet

Directions: Study the figures drawn and identify them on the lines below using symbols.



1. line segments ____________ ____________ ____________

2. lines ____________ ____________

3. rays ____________ ____________

4. angles ____________ ____________

Directions: Draw and label the following:

5. $\overline{AB}$

6. $\overrightarrow{CD}$

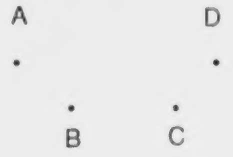
7. $\overleftrightarrow{FG}$

8. $\angle ABC$

Activity Sheet

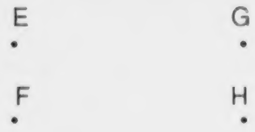
Directions: Draw lines connecting the given points, and write the names of the resulting figures.

1.



___________ is parallel to ___________ .

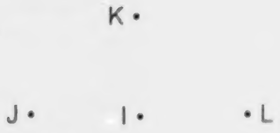
2.



___________and ______________

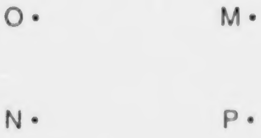
are horizontal line segments.

3.



__________ is perpendicular to__________ .

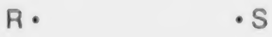
4.



_____________and _____________

are vertical lines.

5.



_________ is a ray.

Section 2

What This Section is About...

In this section you will learn to identify angles by their measure and by their relationship to other angles and will learn to use a protractor. You will also learn to classify triangles by angles or sides.

ANGLES AND TRIANGLES

Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Identify types of angles—acute, obtuse, right, straight, complementary, and supplementary 2. Measure angles using a protractor 3. Identify triangles by angles 4. Identify triangles by sides	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Identify Types of Angles**

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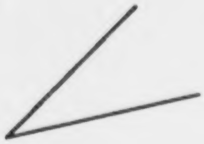
How do you identify an acute angle?

Example: What is an *acute* angle?

acute angle — an angle having a measure greater than 0° but less than 90°



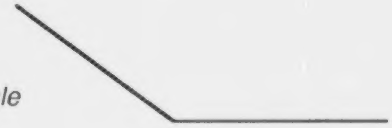
acute angle

?

How do you identify an obtuse angle?

Example: What is an *obtuse* angle?

obtuse angle — an angle having a measure greater than 90°, but less than 180°



obtuse angle

Concept: **Identify Types of Angles**

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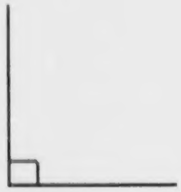
How do you identify a right angle?

Example: What is a *right* angle?

right angle—the measure of a right angle is 90°

right angle



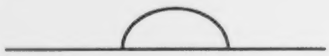
?

How do you identify a straight angle?

Example: What is a *straight* angle?

straight angle—the measure of a straight angle is 180°

straight angle



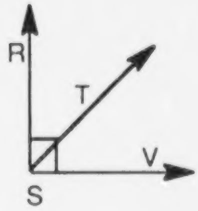
?

How do you identify complementary angles?

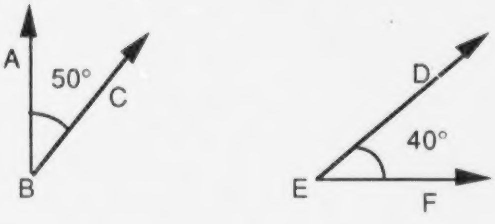
Example: What are *complementary* angles?

complementary angles—two angles whose measures have a sum of 90°

complementary angles



< RST and < TSV are complementary



<ABC and <DEF are complementary.

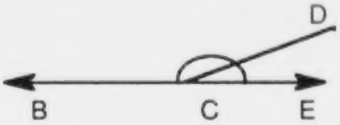
?

How do you identify supplementary angles?

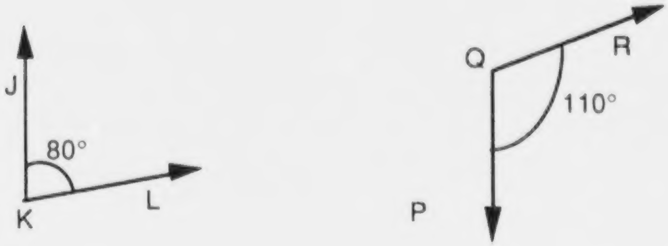
Example: What are *supplementary* angles?

supplementary angles — two angles whose measures have a sum of 180°

supplementary angles



< BCD and < DCE are supplementary.



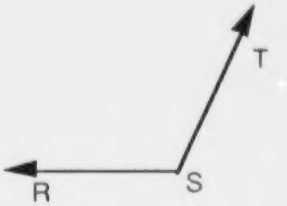
< JKL and < PQR are supplementary.

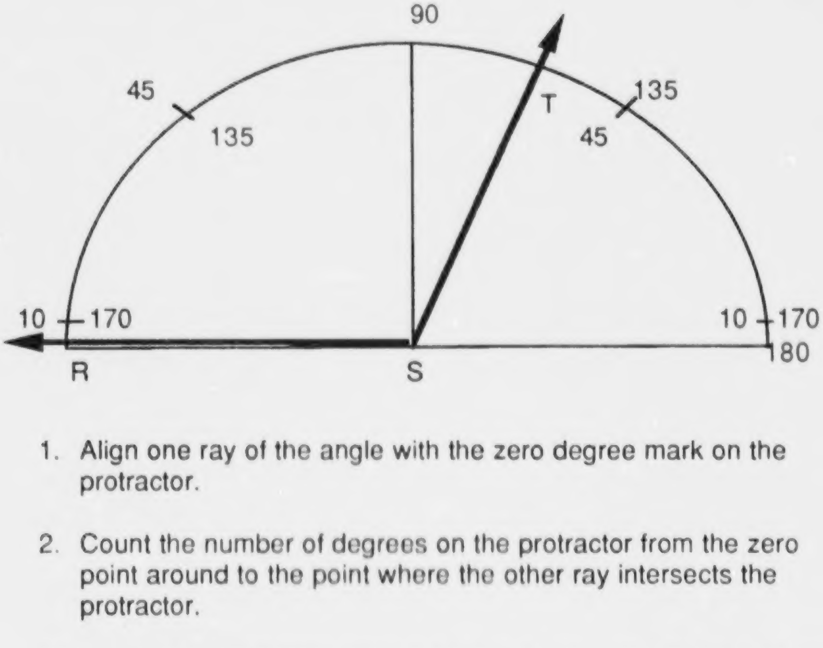
Concept: **Measure Angles Using a Protractor**

?

How do you measure an angle using a protractor?

Example: Measure of < RST is 125°.





1. Align one ray of the angle with the zero degree mark on the protractor.

2. Count the number of degrees on the protractor from the zero point around to the point where the other ray intersects the protractor.

Note: Some protractors have a double scale—one going clockwise and the other counterclockwise. Be sure to follow the correct scale.

Concept: **Identify Triangles by Angles**

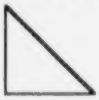
?

How do you identify triangles by angles?

Example: A triangle is a closed, three-sided figure having three angles.

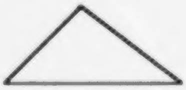
1. A *right* triangle has exactly one 90° angle. The other two angles measure less than 90°.

Right Angle



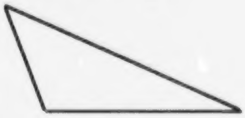
2. An *acute* angle triangle has three angles measuring less than 90°.

Acute Angle



3. An *obtuse* angle triangle has one angle measuring more than 90°

Obtuse Angle



Concept: **Identify Triangles by Sides**

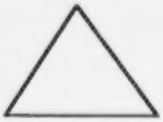
?

How do you identify triangles by sides?

Example: A triangle has three (3) sides.

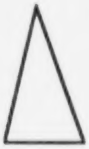
1. An ***equilateral*** triangle has *three equal* sides.

equilateral triangle



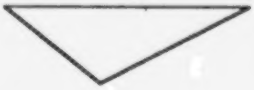
2. An ***isosceles*** triangle has *two equal* sides.

isosceles triangle



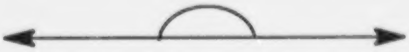
3. A ***scalene*** triangle has *no equal* sides.

scalene triangle

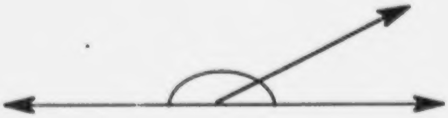


Quiz

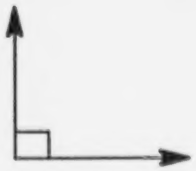
Directions: Identify each angle or pair of angles by name.



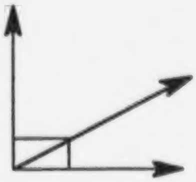
1. ______________________



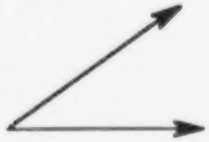
2. ______________________



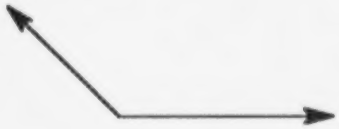
3. ______________________



4. ______________________



5. ______________________

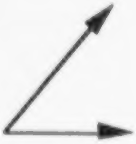


6. ______________________

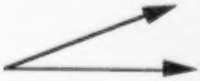
Quiz

Directions: Measure the following angles, using a protractor. Write the measurement on the line.

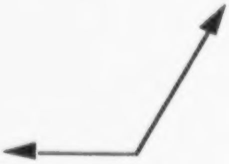
1. ______________



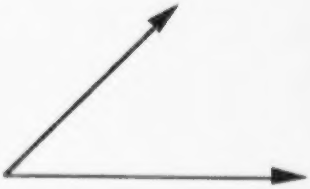
2. ______________



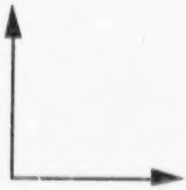
3. ______________



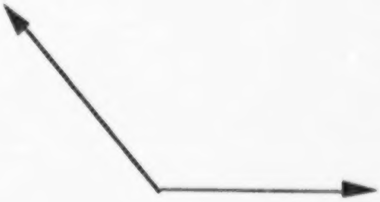
4. ______________



5. ______________



6. ______________



Vocabulary

☞ **Directions:** Study the words below.

< Angles >

acute angle — an angle measuring greater than 0° but less than 90°

complementary angle — either of two angles which together form an angle of 90°

degree — a unit of measure for angles, 1/90 of a right angle; symbol: °

obtuse angle — an angle measuring greater than 90° but less than 180°

protractor — an instrument for measuring the number of degrees (°) in an angle

right angle — an angle that measures 90°

straight angle — an angle that measures 180°

supplementary angle — either of two angles which together form an angle of 180° (a straight line)

vertex — a point that two rays of an angle have in common

vertices — plural of vertex

Δ Triangles Δ

acute triangle — a triangle with each angle measuring less than 90°

equilateral triangle — a triangle with all three sides having the same length

obtuse triangle — a triangle with one obtuse angle

isosceles triangle — a triangle with two sides having the same length

right triangle — a triangle with a right angle

scalene triangle — a triangle with three sides, each having a different length

triangle — a three-sided polygon

Vocabulary

Directions: Match the definition with the word.
Write the letter in the blank.

______1.	acute triangle	a.	one angle measures 90°
______2.	obtuse triangle	b.	angles measure less than 90°
______3.	right triangle	c.	one angle measures greater than 90° but less than 180°
______4.	scalene triangle	d.	two sides have the same length
______5.	equilateral triangle	e.	each side has a different length
______6.	isosceles triangle	f.	all three sides have the same length

Vocabulary

Directions: Fill in the blank with the correct vocabulary word.

1. The measure of a(n) ______________ angle is greater than 0° and less than 90°.

2. The measure of a(n) ______________ angle is 90°.

3. The measure of a(n) ______________angle is 180°.

4. The measure of a(n) ______________ angle is greater than 90° and less than 180°.

5. The sum of the measures of two ______________ angles is 180°.

6. The sum of the measures of two ___________ angles is 90°.

Directions: Match the items below. Write the letter of the best answer in each blank.

1.______ acute

2.______ obtuse

3.______ right

4.______ straight

5.______ complementary

6.______ supplementary

a. never cross

b. sum of two angles is 90°

c. greater than 90°

d. meet at right angles

e. 90°

f. sum of two angles is 180°

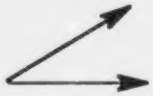
g. 180°

h. less than 90°

Activity Sheet

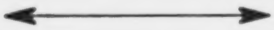
Directions: Label the following angles as **acute**, **obtuse**, **right** or **straight**. Write the correct word on the line.

1.



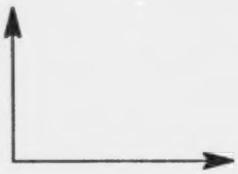
____

2.



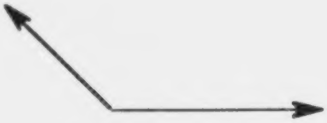
____

3.



____

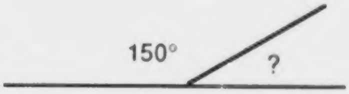
4.



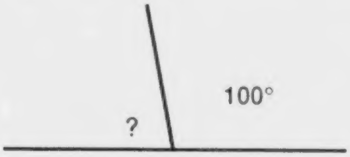
____

Activity Sheet

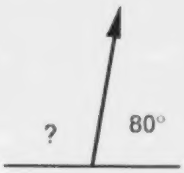
Directions: Find the measure of the missing supplementary angle.



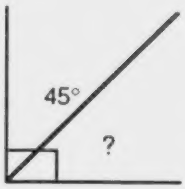
1. ________



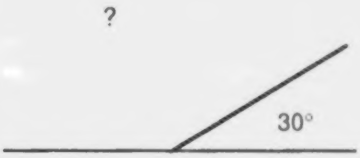
2. ________



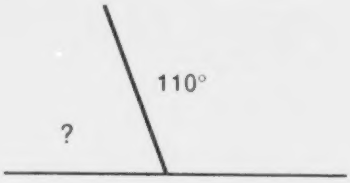
3. ________



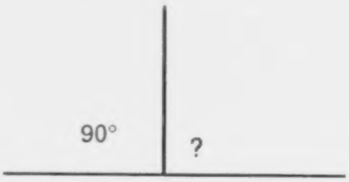
4. ________



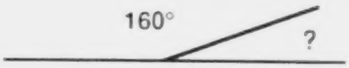
5. ________



6. ________



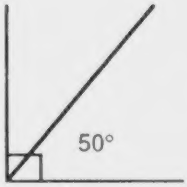
7. ________



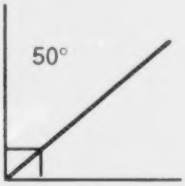
8. ________

Activity Sheet

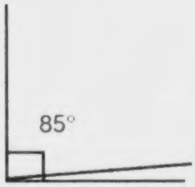
Directions: Find the complements.



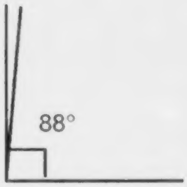
a. ______________



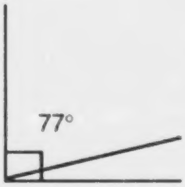
b. ______________



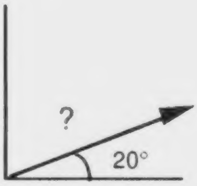
c. ______________



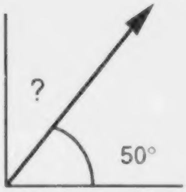
d. ______________



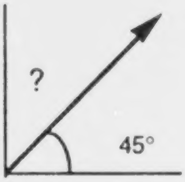
e. ______________



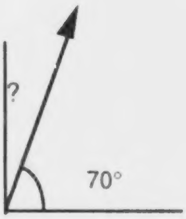
f. ______________



g. ______________



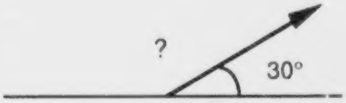
h. ______________



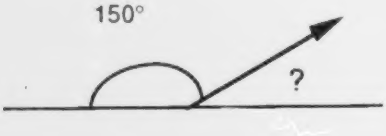
i. ______________

Activity Sheet

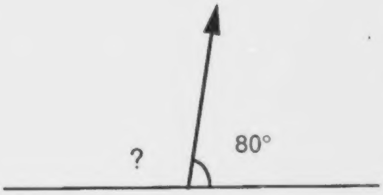
Directions: Find the measure of the missing supplementary angle.



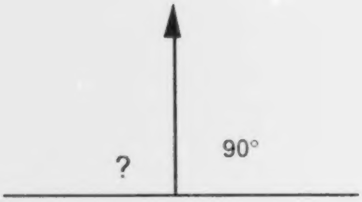
a. ____________



b. ____________



c. ____________



d. ____________

Directions: Draw an example of each angle, or pair of angles.

e. acute

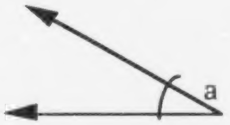
f. obtuse

g. right

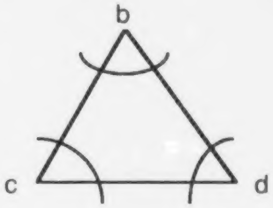
h. complementary

Activity Sheet

Directions: Measure each angle indicated.
Write the answer in the blank.



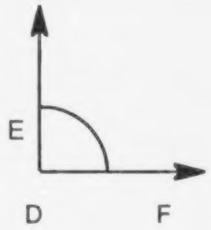
1. a. ________°



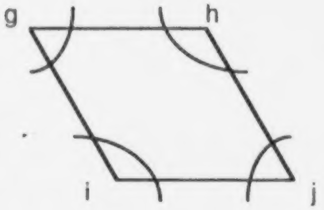
2. b. ________°

c. ________°

d. ________°



3. ∠DEF ________°

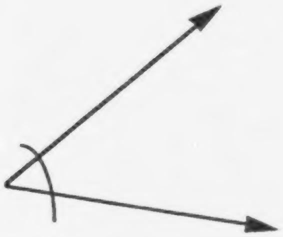


4. g. ________°

h. ________°

i. ________°

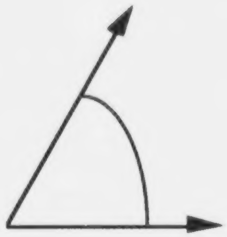
j. ________°



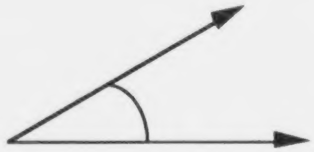
5. k. ________°

Activity Sheet

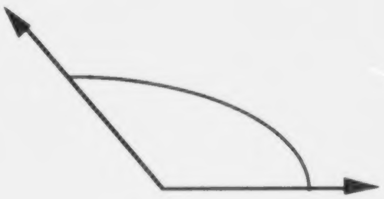
Directions: Measure the angles, and write the answers in the blanks.



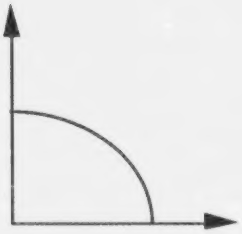
1. ____________



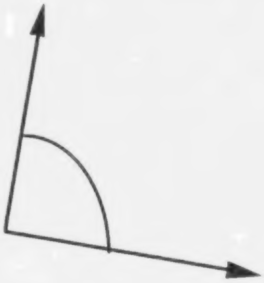
2. ____________



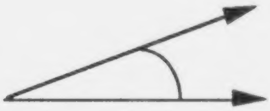
3. ____________



4. ____________



5. ____________

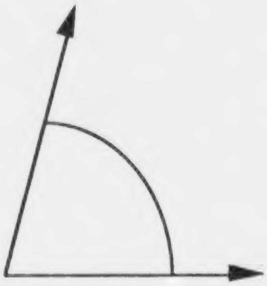


6. ____________

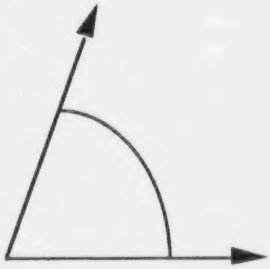
530

Activity Sheet

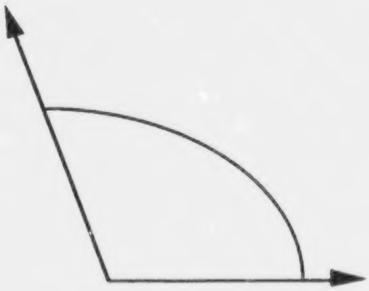
Directions: Measure the angles, and write the answers in the blanks.



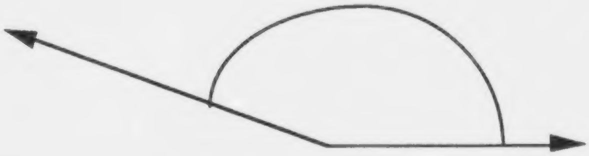
7. ______________



8. ______________



9. ______________

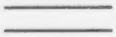


10. ______________

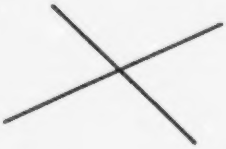
Activity Sheet

Directions: Name the lines. Use **P** for Parallel, **PP** for Perpendicular, **N** for Neither.

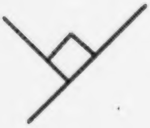
1. ________



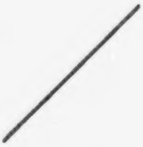
2. ________



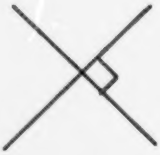
3. ________



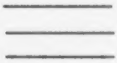
4. ________



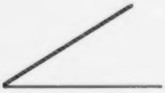
5. ________



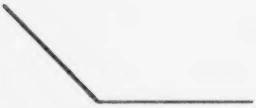
6. ________



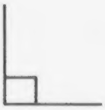
Directions: Name the angles. **A** = Acute, **O** = Obtuse, or **R** = Right.



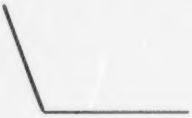
7. ________



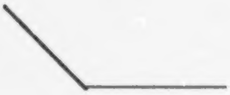
8. ________



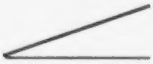
9. ________



10. ________



11. ________

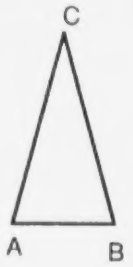


12. ________

Activity Sheet

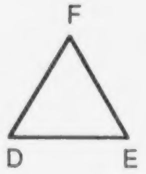
Directions: Measure the sides using a ruler to determine if the triangle is **equilateral, isosceles**, or **scalene**. Write the name on the line.

1.



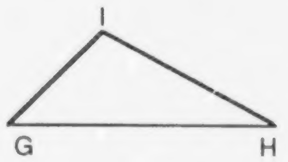
Δ ABC = ____________________

2.



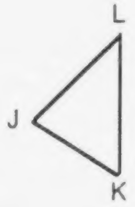
Δ DEF = ____________________

3.



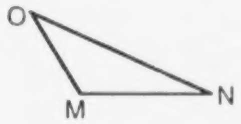
ΔGHI = ____________________

4.



Δ JKL = ____________________

5.

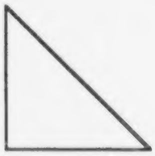


Δ MNO = ____________________

Activity Sheet

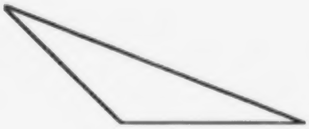
Directions: Measure the angles in each triangle to determine if the angle is **right, acute**, or **obtuse**. Write the correct name of the triangle on each line.

1.



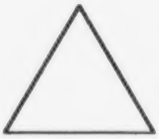
____

2.



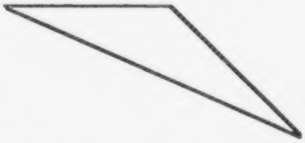
____

3.



____

4.



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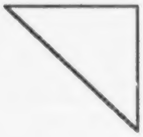
5.



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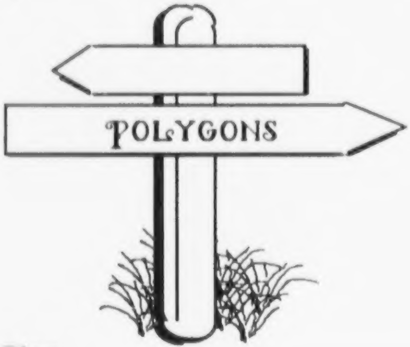
Section 3



What This Section is About...

In this section you will learn to identify polygons with up to eight sides, and learn to identify congruent and similar polygons.

Suggested Plan

Checkpoints	Activities
✓ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✓ What concepts will be presented? 1. Identify various quadrilaterals—squares, rectangles, parallelograms, rhombi, trapezoids 2. Identify pentagons, hexagons, heptagons, and octagons 3. Identify congruent and similar polygons	✍ See examples on the following pages.
✓ How much do I already know?	✍ Take Quiz as pretest.
✓ What vocabulary words are introduced?	✍ See Vocabulary.
✓ What practice is provided?	✍ Do Activity Sheets.
✓ What if i need extra help?	✍ Refer to examples in this section.
✓ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Identify Various Quadrilaterals**

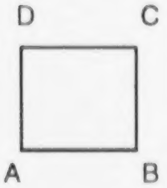
?

How do you identify various quadrilaterals?

Example: *Quadrilaterals* are polygons with four sides.

1. A *square* is a quadrilateral with four equal sides and four right angles.

square



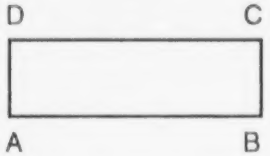
$$\angle A = \angle B = \angle C = \angle D = 90^\circ$$

$$\overline{AB} \parallel \overline{CD},\quad \overline{AC} \parallel \overline{BD}$$

$$\overline{AB} = \overline{AC} = \overline{CD} = \overline{BD}$$

2. A *rectangle* is a parallelogram with four right angles.

rectangle



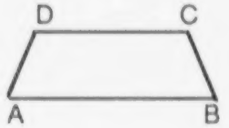
$$\angle A = \angle B = \angle C = \angle D = 90^\circ$$

$$\overline{AB} \parallel \overline{CD}$$

$$\overline{AD} \parallel \overline{BC}$$

3. A *trapezoid* is a quadrilateral with exactly one pair of parallel sides.

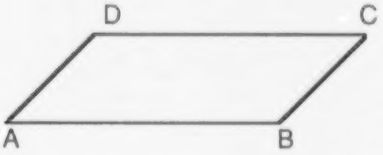
trapezoid



$\overline{AB} \parallel \overline{CD}$

4. A *parallelogram* is a quadrilateral with two pairs of opposite sides which are parallel and equal.

parallelogram

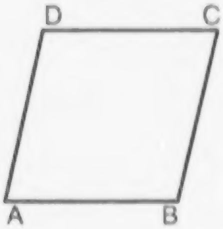


$\overline{AC} \parallel \overline{BD}$

$\overline{AB} \parallel \overline{CD}$

5. A *rhombus* is a parallelogram with four equal sides

rhombus



$\overline{AB} \parallel \overline{CD}$

$\overline{AD} \parallel \overline{BC}$

$\overline{AB} = \overline{AC} = \overline{CD} = \overline{BD}$

Concept: Identify Pentagons, Hexagons, Heptagons, and Octagons

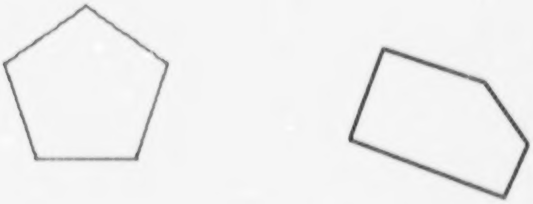
?

How do you identify pentagons, hexagons, heptagons, and octagons?

Example: The following are simple closed figures called *polygons*. These figures are made of line segments called *sides*.

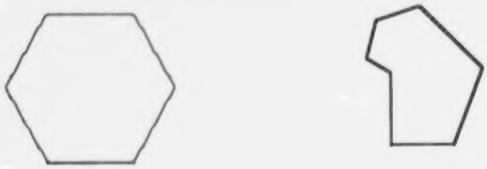
1. A *pentagon* is a polygon with *five* sides.

pentagons



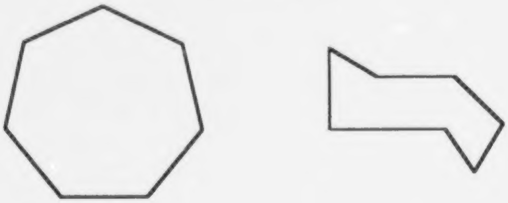
2. A *hexagon* is a polygon with *six* sides.

hexagons



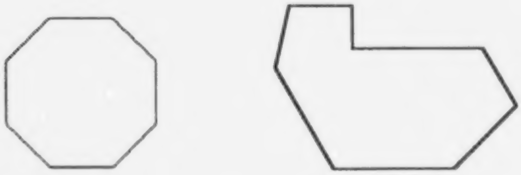
3. A *heptagon* is a polygon with *seven* sides.

heptagons



4. An *octagon* is a polygon with *eight* sides.

octagons

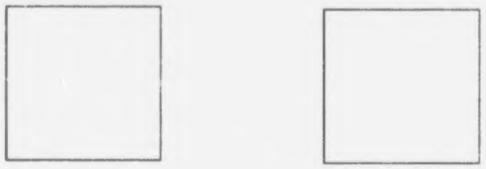


Concept: **Identify Congruent and Similar Polygons**

?

How do you identify congruent polygons?

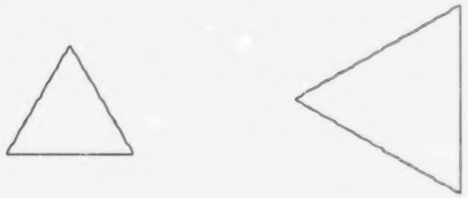
Example: *Congruent* polygons are two or more polygons with exactly the same shape and size. Position may vary.



?

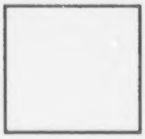
How do you identify similar polygons?

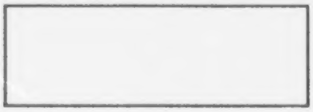
Example: *Similar* polygons are two or more polygons having the same shape but varying in sizing or position or both.

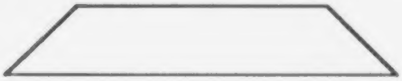


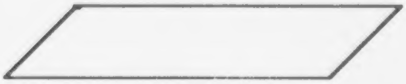
Quiz

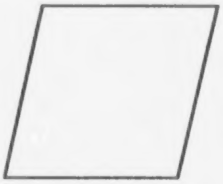
Directions: Identify the name of each figure pictured below. Write its name beside the figure.

1.  ______________________

2.  ______________________

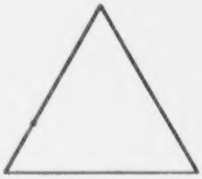
3.  ______________________

4.  ______________________

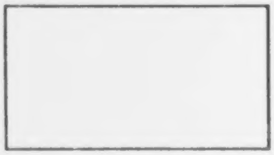
5.  ______________________

Quiz

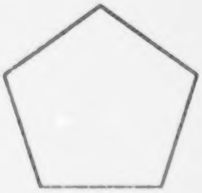
Directions: Name these figures.



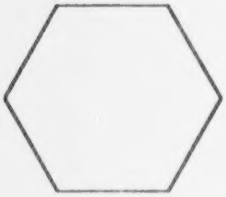
1. ______________



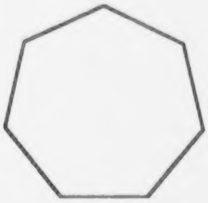
2. ______________



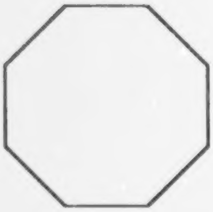
3. ______________



4. ______________



5. ______________

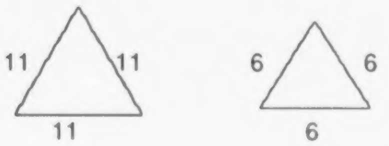


6. ______________

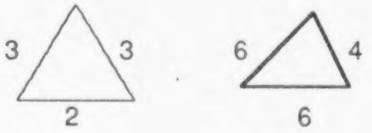
Quiz

Directions: Write an **S** beside the polygons that are similar. Write a **C** beside the polygons that are congruent. Write an **N** beside the polygons that are neither.

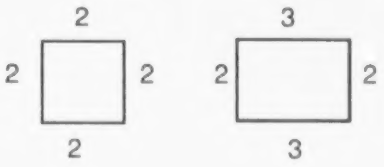
_____ 1.



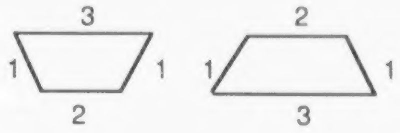
_____ 2.



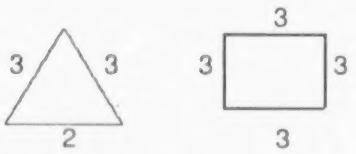
_____ 3.



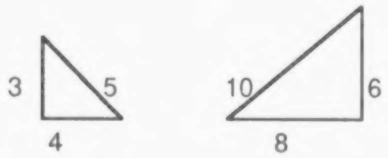
_____ 4.



_____ 5.



_____ 6.



Vocabulary

Directions: Study the words and definitions.

congruent polygons — polygons having the same shape and size; positions may vary

heptagon — seven-sided polygon

hexagon — six-sided polygon

octagon — eight-sided polygon

parallelogram — a quadrilateral with two pairs of opposite sides which are parallel and equal

pentagon — five-sided polygon

plane — flat surface that extends to infinity in all directions

polygon — a closed figure formed by line segments

quadrilateral — a polygon with four closed sides

rectangle — a quadrilateral with four right angles

rhombus — a parallelogram with four equal sides and two pairs of parallel sides

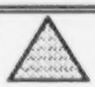
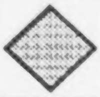
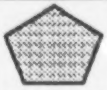
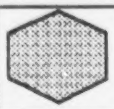
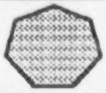
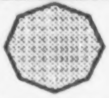
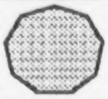
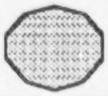
similar polygons — polygons having the same shape but varying in size

square — a quadrilateral with four equal sides

trapezoid — a quadrilateral with one pair of parallel sides

Study Sheet

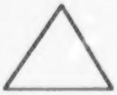
Directions: Study the chart below.

The Name of the Polygon	The Shape	Number of Sides
Triangle		3
Quadrilateral		4
Pentagon		5
Hexagon		6
Heptagon		7
Octagon		8
Nonagon		9
Decagon		10

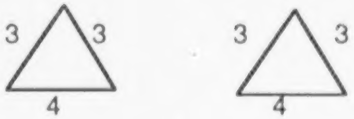
Vocabulary

Directions: Identify the figures below.
Write: **P** for polygon
S for similar polygons
C for congruent polygons

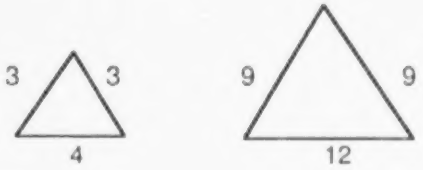
____ 1.



____ 2.



____ 3.



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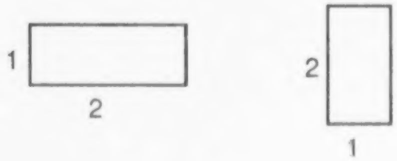

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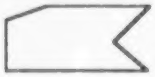

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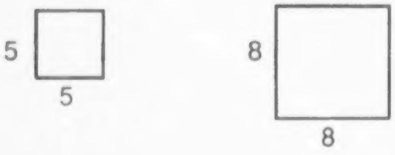


Activity Sheet

Directions: Fill in the blank with the best vocabulary word.

1. A ____________________ is a quadrilateral that has two pairs of sides of the same length and four right angles.

2. A ____________________ has four right angles and four sides of the same length.

3. A ________________ has exactly one pair of parallel sides.

4. A ____________________ has two pairs of parallel sides and four sides of the same length.

5. A ______________________ is any figure with two pairs of opposite sides which are parallel and equal.

6. A ________________ is a polygon with four sides.

7. A ____________________ is a closed figure formed by line segments.

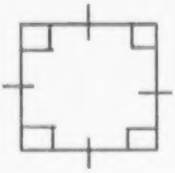
Activity Sheet

Directions: Identify each of the figures below. Write the correct name on each blank.

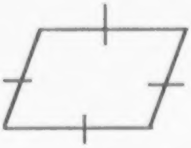
rhombus
square

rectangle
parallelogram

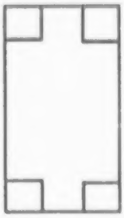
trapezoid



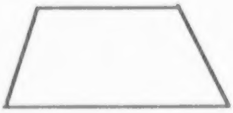
1. ____________



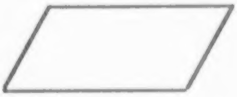
2. ____________



3. ____________



4. ____________



5. ____________

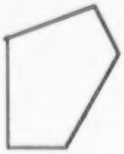
Activity Sheet

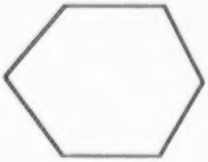
☞ **Directions:** Match the vocabulary word with the correct definition. Write the letter on the line.

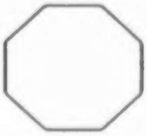
1. ______ octagon	a. polygon with five sides
2. ______ pentagon	b. polygon with six sides
3. ______ heptagon	c. polygon with seven sides
4. ______ hexagon	d. polygon with eight sides
5. ______ triangle	e. polygon with four sides
6. ______ quadrilateral	f. polygon with three sides

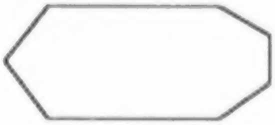
Activity Sheet

Directions: Label each of the following polygons as **octagon**, **pentagon**, **heptagon**, or **hexagon**.

1.  ______________________

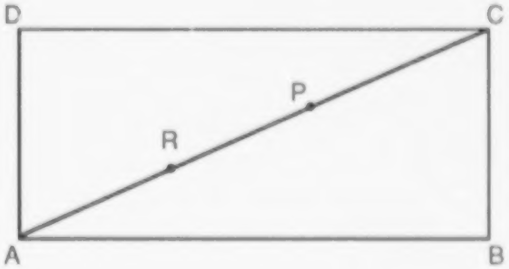
2.  ______________________

3.  ______________________

4.  ______________________

Activity Sheet

Directions: Look at this figure and answer the following questions.



________1. Name any point.

________2. Name three line segments starting at Point R.

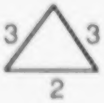
________3. Name two line segments starting at Point D.

________4. Name a triangle that contains Point D.

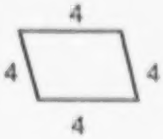
________5. Name the quadrilateral.

Activity Sheet

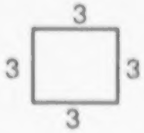
Directions: Match each figure with one at the bottom that is congruent or similar. Write the letter in the blank. Then circle **S** or **C** to indicate similar or congruent.

1. 

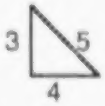
____ S or C

2. 

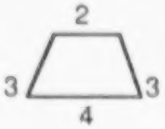
____ S or C

3. 

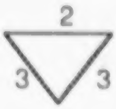
____ S or C

4. 

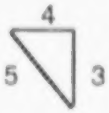
____ S or C

5. 

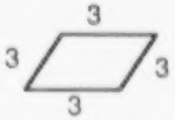
____ S or C



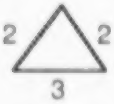
A.



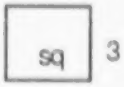
B.



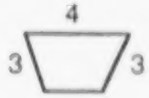
C.



D.



E.



F.

Activity Sheet

☞ **Directions**: Draw three pairs of similar polygons and three pairs of congruent polygons. Circle **C** for congruent and **S** for similar.

1.

S or C

2.

S or C

3.

S or C

4.

S or C

5.

S or C

6.

S or C

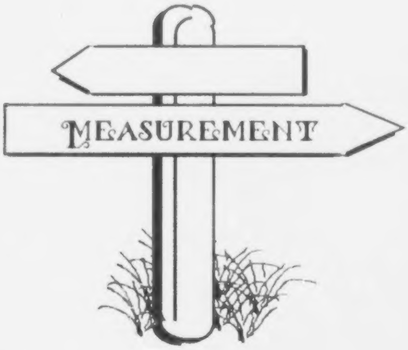
UNIT 6: MEASUREMENT

UNIT 6: MEASUREMENT

Unit 6

What This Section is About...

In this unit on measurement you will work in four different areas—time, distance, capacity, and weight/mass. Practice exercises will include using a conversion factor to convert smaller units to larger ones and larger units to smaller ones. You will also solve problems relating to these units of measurement.



Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Find elapsed time 2. Solve problems involving units of distance/length 3. Solve problems involving units of capacity 4. Solve problems involving units of weight/mass	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Use examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

UNIT 6: MEASUREMENT

Converting Units of Measurement...

In order to solve problems containing different units of measurement, it is necessary to convert the items to the same unit of measurement before solving the problem.

To convert from a *larger* unit to a *smaller* one, the operation will be *multiplication*. To convert from a *smaller* unit to a *larger* unit, *divide*. Think: there will be *more* smaller units than large. Therefore, to increase the number—multiply. Changing a small unit to a larger unit will decrease the number—so, divide to get a smaller number. (See page 326.)

When converting units of measure in the metric system, the conversion factors will always be a power of ten (10, 100, 1000, etc.). Study the conversion charts in the student section on pages 333 (distance/length), 343 (capacity), and 348 (weight/mass). Use these charts when converting metrics units of measurement.

Unlike the metric system, where powers of ten are easily used to make conversions, in the customary system there are many different conversion factors (12, 4, 365, 3, 16, 7, 52, etc.). These are just a few from which to choose. Study the equivalency charts on pages 333 (distance/length), 343 (capacity), and 348 (weight/mass) to determine the conversion factor needed to solve the problem presented.

Concept: Find Elapsed Time

?

How do you find elapsed time?

Example 1: Find the elapsed time from 9:45 a.m. to 10:00 a.m.

Step 1: Place in vertical form, making sure each unit is in the proper column. Subtract the beginning time from the ending time.

$$\begin{array}{r} 10:00\text{ a.m.} \\ -\,9:45\text{ a.m.} \\ \hline \end{array}$$

Step 2: Regroup, if necessary, and subtract.

$$\begin{array}{r} 10:00\text{ a.m.} \\ -\quad 9:45\text{ a.m.} \\ \hline \end{array} \qquad \begin{array}{r} \text{(regroup) } 9:\overset{5}{\cancel{0}}\overset{10}{\cancel{0}} \\ -\quad 9:45 \\ \hline \end{array}$$

Solution: 15 minutes

Example 2: Find the elapsed time from 5:45 a.m. to 6:15 p.m.

Step 1: Change the p.m. time to military time by adding 1200 hours to the p.m. time.

$$\begin{array}{rl} 6:15 & \text{p.m.} \\ \underline{12:00} & \\ 18:15 & \text{military time} \end{array}$$

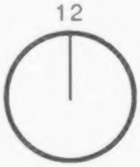
Step 3: Subtract the a.m. time from the p.m. time (as expressed by military time). Regroup, if necessary.

$$\begin{array}{r} 18:15 \\ \underline{-\ 5:45} \end{array} \quad \text{(regroup)} \longrightarrow \quad \begin{array}{r} 17:75 \\ \underline{-\ \ 5:45} \\ 12:30 \end{array}$$

Solution: 12 hours and 30 minutes

Example 2: Find the elapsed time from Tuesday, 8:30 a.m. to Wednesday, 7:30 p.m.

Step 1: Find the total number of days (full 24 hr units) elapsed.



Step 2: Find the elapsed time in minutes and hours from 8:30 a.m. to 7:30 p.m.

$$\begin{array}{rl} 7:30 & \text{p.m.} \\ \underline{+\ 12:00} & \\ 19:30 & \text{military time} \end{array} \qquad \begin{array}{rl} 19:30 & \\ \underline{-8:30} & \\ 11:00 & \text{hr} \end{array}$$

Solution: 11 hours

Step 3: Find the total elapsed time.

Solution : 1 day, 11 hours

Concept: Solve Problems Involving Units of Distance/Length

?

How do you solve problems involving units of distance/length?

Example 1: Multiply

$$\begin{array}{r} \text{5 yd 11 in.} \\ \underline{\times \qquad\quad 4} \end{array}$$

Step 1:

$$\begin{array}{rrr} & \text{5 yd} & \text{11 in.} \\ \times & & 4 \\ \hline & \text{20 yd} & \text{44 in.} \end{array}$$

Step 2: Convert inches to yards. Choose conversion factor (36). See pp. 326 and 333.

Think:

$$\begin{array}{r} \text{1 yd 8 in.} \\ 36\,\overline{)\,44} \\ \underline{36} \\ 8 \end{array}$$

Step 3: 20 yd 44 in. = 21 yd 8 in.

Example 2: 6 yd 1 ft 6 in. ÷ 3

Step 1: Change 6 yd 1 ft 6 in. to inches.

$= (6 \times 36) + (1 \times 12) + 6$

$= 234$ in.

Step 2: Now divide: 234 in. ÷ 3 = 78 in.

Step 3: Simplify: 78 in. = 6 ft 6 in.

Concept: **Solve Problems Involving Units of Capacity**

?

How do you solve problems involving units of capacity?

Example 1: Add: 1 qt 1 pt 1 c to 2 qt 1 c

Step 1: Write the problem vertically, aligning the common units. Add.

$$\begin{array}{rrrr} & 1\text{ qt} & 1\text{ pt} & 1\text{ c} \\ + & 2\text{ qt} & & 1\text{ c} \\ \hline & 3\text{ qt} & 1\text{ pt} & 2\text{ c} \end{array}$$

Step 2: Simplify.

$$\begin{aligned} 3\text{ qt } 1\text{ pt } 2\text{ c} &= 3\text{ qt } 1\text{ pt} + 1\text{ pt} \\ &= 3\text{ qt } 2\text{ pt} \\ &= 4\text{ qt} \\ &= 1\text{ gal.} \end{aligned}$$

Solution: 1 gal.

Example 2: Multiply 4.03 km x 6

Step 1: Write vertically and mulitply.

$$\begin{array}{r} 4.04\text{ km} \\ \times\ 6 \\ \hline 24.18\text{ km} \end{array}$$

Solution: 24.18 km

Concept: **Solve Problems Involving Units of Weight/Mass**

?

How do you solve problems involving units of weight/mass?

Example 1: 2 tons − 1325 lb

Step 1: Convert tons to pounds. Choose conversion factor (2000). See pp. 326 and 348.

2 tons = 4000 lb

Step 2: Write the problem vertically. Subtract.

$$\begin{array}{r} 4000 \text{ lb} \\ -\ 1325 \text{ lb} \\ \hline 2675 \text{ lb} \end{array}$$

Step 3: Simplify.

2675 lb = 1 ton 675 lb

Example 2: Add 62 cm + 31.79 m

Step 1: Convert to common unit

31.79 m = 3179 cm

Step 2: Write problem vertically, and add.

$$\begin{array}{r} 62 \text{ cm} \\ +\ 3179 \text{ cm} \\ \hline 3241 \text{ cm} \end{array}$$

Step 3: Convert back to larger unit. (Simplify.)

3241 cm = 32.41 m

UNIT 6: MEASUREMENT

Concept: Solve Measurement Word Problems

?

What steps do you use to solve measurement word problems?

Example: Solve the following real-world problem.

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

Step 1: Read the problem.

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

Step 2: Circle key words and phrases.

rectangular
around
how much

Sam is going to put tape **around** a **rectangular** table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By **how much?**

Step 3: Underline the question or what is being asked.

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

Step 4: Determine the operation(s).

1) Add—*around*
2) Subtract—*by how much*

Step 5: Write a number sentence. (Cannot do because units are not alike.)

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

Convert using chart. (See p. 326)

2.5 m = 250 cm

Step 6: Compute the problem.

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

a. P = 2 x length + 2 x width

b.
$$\begin{array}{rrcl} & 2 \times 70\text{ cm} & = & 140\text{ cm} \\ + & 2 \times 60\text{ cm} & = & 120\text{ cm} \\ \hline & \text{perimeter} & = & 260\text{ cm} \end{array}$$

c.
$$\begin{array}{rrl} & 260\text{ cm} & \text{perimeter} \\ - & 250\text{ cm} & \text{length of tape} \\ \hline & 10\text{ cm} & \text{too short} \end{array}$$

Step 7. Reread, and ask: "Is the answer reasonable?"

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

Round to whole numbers and estimate.

Step 8. Write the answer: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. *Caution:* your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

Solution: 10 cm

Quiz

Directions: Convert the following (excluding leap year).

1. 4 yr = ________ mo
2. 2 yr 6 mo = ________ mo
3. 2 yr = ________ wk
4. 2 yr 9 wk = ________ wk
5. 4 yr = ________ da
6. 1 yr 200 da = ________ da
7. 6 wk = ________ da
8. 5 da = ________ hr
9. 9 da 8 hr = ________ hr
10. 36 mo = ________ yr
11. 104 wk = ________ yr
12. 59 mo = ________ yr (write remainder in mo)
13. 168 hr = ________ da
14. 12 da 48 hr = ________ da
15. 28 da = ________ wk
16. 16 wk 49 da = ________ wk
17. 12 da 72 hr = ________ da
18. 12 wk = ________ hr
19. 5 yr = ________ da
20. 730 da = ________ yr

Quiz

☞ **Directions:** Fill in the blanks below.

Find the elapsed time:

1. From 8:35 a.m. to 11:30 a.m. ________
2. From 3:10 p.m. to 10:30 p.m. ________
3. From 5:45 a.m. to 6:15 p.m. ________
4. From Monday 7:30 a.m. to Thursday 4:50 p.m. ________
5. From 9:00 a.m. to 8:00 p.m. ________
6. From Tuesday 9:00 a.m. to Friday 10:00 a.m. ________
7. From 8:00 p.m. to 11:45 p.m. ________
8. From 7:00 a.m. to 7:45 p.m. ________
9. From Monday 3:00 p.m. to Tuesday 6:00 p.m. ________
10. From 5:30 a.m. to 4:10 p.m. ________

Vocabulary

Directions: Study the words below.

capacity — amount a vessel holds or contains

conversion factor — the number used when making a conversion from one unit to another

Example: to convert between feet and inches the conversion is *12*
to convert between ounces and pounds the conversion factor is *16*

distance — how far between two points or locations if following a straight line

elapsed time — how much time passes

length — see distance

linear — having to do with a straight line

mass — a metric term closely related to weight

meter — the base unit of length in the metric system

military — based on a 24 hour clock (as opposed to 2–12 hour periods)

weight — how heavy an object is

Vocabulary Activity

Directions: Fill in the blanks with the *best* word. Some words may be used more than once—some not at all.

length
time
liter
distance
capacity
gram
weight
meter
mass

1. The ______________ is the basic unit of length in the metric system.

2. ______________ is measured by teaspoons, milliliters, liters, or quarts.

3. In the customary system, feet, inches, and yards are units of ______________ .

4. In both the metric and customary systems, seconds, minutes, hours, and centuries are units of ______________ .

5. Miles and kilometers are units used to measure ______________ .

6. ______________ is measured in units such as ounces, pounds, and tons.

7. The basic metric unit of mass is the __________ .

8. The __________ is the basic metric unit of capacity.

9. The kilogram is a unit commonly used to measure______ in the metric system.

Study Sheet

Directions: Study the charts below.

Equivalent Units of Time

60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1 day
7 days = 1 week
52 weeks = 1 year
365 days = 1 year
12 months = 1 year

Units of Time Abbreviations

seconds = sec
minutes = min
hours = hr
days = da
weeks = wk
months = mo
years = yr

Examples of Military Time

Standard		Written	Stated
8 a.m.	=	0800 hours	oh eight hundred
8 p.m.	=	2000 hours	twenty hundred

Study Sheet

Directions: Study the conversion factor charts for customary measurement below.

CONVERTING UNITS OF MEASUREMENT

Larger To Smaller		Smaller To Larger	
Steps	**Examples**	**Steps**	**Examples**
1. Choose the **units** of operation.	**hours** to minutes **feet** to inches **weeks** to days	1. Choose the **units** of operation.	feet to **yards** ounces to **pounds** weeks to **years**
2. Identify the **conversion factor.**	1 hr → (60) min 1 ft → ⑫ in. 1 wk → ⑦ da	2. Identify the **conversion factor.**	③ ft → 1 yd ⑯ oz → 1 lb (52) wk → 1 yr
3. **Multiply** the number of units times the conversion factor.	2 hr x (60) = 120 min 2 ft x ⑫ = 24 in. 2 wk x ⑦ = 14 da	3. **Divide** the number of units by the conversion factor.	6 ft ÷ ③ = 2 yd 48 oz ÷ ⑯ = 3 lb 104 wk ÷ (52) = 2 yr

Activity Sheet

☞ **Directions**: Follow the directions below.

A. **Change to months:**

1. 3 yr = _______mo
2. 4 yr 4 mo = _______mo
3. 9 yr 7 mo = _______mo
4. 2 yr = _______mo
5. 5 yr 9 mo = _______mo

B. **Change to weeks:**

1. 2 yr = _________wk
2. 3 yr 16 wk = _________wk
3. 3 1/2 yr = _________wk
4. 1 yr 41 wk = _________wk
5. 4 yr 8 wk = _________wk

C. **Change to days:**

1. 8 wk = ________da
2. 6 yr = _______da
3. 1 yr 185 da = _________da
4. 30 wk 5 da = _________da

D. **Change to hours:**

1. 2 da 4 hr = ________hr
2. 36 wk = _______hr
3. 1 yr 4 mo = ________hr
4. 30 da = ________hr

E. **Change to years:** (Write remainder as fraction)

1. 15 mo = __________yr
2. 32 mo = __________yr
3. 80 mo = __________yr

Activity Sheet

Directions: Follow the directions below.

A. **Change to minutes:**

1. 5 hr = __________
2. 1 hr 30 min = __________
3. 14 hr 8 min = __________
4. 21 hr = __________
5. 18 hr = __________

B. **Change to seconds:**

1. 7 min = __________
2. 5 min 20 sec = __________
3. 24 min = __________
4. 52 min = __________
5. 45 min 6 sec = __________

C. **Change to weeks:** (Write remainder in days)

1. 15 da = __________
2. 11 da = __________
3. 38 da = __________
4. 62 da = __________
5. 90 da = __________

Activity Sheet

☞ **Directions**: Follow the directions below.

A. **Change to hours**: (Write remainders in minutes)

1. 480 min = ________
2. 120 min = ________
3. 84 min = ________
4. 942 min = ________
5. 30 min = ________

B. **Change to minutes:** (Write remainders in seconds)

1. 540 sec = ________
2. 780 sec = ________
3. 72 sec = ________
4. 19 hr 30 min = ________
5. 2 hr 15 min = ________

C. **Change to weeks**: (Write remainders in days)

1. 375 days = ________
2. 29 days = ________
3. 15 days = ________
4. 11 days = ________
5. 38 days = ________

Activity Sheet

Directions: Fill in the blanks.

1. 5 yr = ____________ da
2. 104 wk = ____________ yr
3. 2 yr = ____________ wk
4. 16 wk 49 da = __________ wk
5. 9 da 8 hr = ___________ hr
6. 19 hr 30 min = ________ min
7. 45 min 6 sec = ________ sec
8. 1 yr 185 da = __________ da
9. 30 da = ____________ hr
10. 3 1/2 yr = ___________ mo

Activity Sheet

☞ **Directions:** Find the elapsed time.

	From	To	Hours	Minutes
1.	1:10 p.m.	6:25 p.m.		
2.	12:00 noon	9:34 p.m		
3.	7:15 a.m.	11:30 a.m.		
4.	2:12 p.m.	8:03 p.m.		
5.	11:00 a.m.	4:00 p.m.		
6.	9:30 a.m.	3:45 p.m.		
7.	10:45 a.m.	3:15 p.m.		
8.	9:55 a.m.	2:20 p.m.		

	From	To	Days	Hours	Minutes
9.	Oct. 10 7:25 a.m.	Oct. 12 11:40 a.m.			
10.	Jan. 30 11:30 a.m.	Feb. 4 4:45 p.m.			

	From	To	Years	Months	Days
11.	Dec. 1, 1990	Oct. 1, 1993			
12.	May 21, 1954	June 6, 1972			

Quiz

Directions: Fill in the blank.

1. 9 ft = ________in.
2. 23 yd = ________in.
3. 40 mi = ________ft
4. 3 ft 2 in. = ________in.
5. 13 ft = ________yd
6. 207 in. = ________ yd
7. 3 miles = ________ft
8. 16 yd = ________ ft
9. 21 mi = ________yd
10. 48 in. = ________ft
11. 27 ft = ________yd
12. 12 in. = ________yd
13. 7,040 yd = ________mi
14. 1 cm = ________m
15. 6 cm = ________mm

Study Sheet

Directions: Study the charts of equivalents and abbreviations below.

Customary Linear Measurement

1 foot (ft) = 12 inches (in.)
1 yard (yd) = 3 feet (ft)
1 yard (yd) = 36 inches (in.)
1 mile (mi) = 1, 760 yards (yd)
1 mile (mi) = 5, 280 feet (ft)

Metric Linear Measurement

meter (m) = the basic unit of length
kilometer (km) = 1000 meters (m)
hectometer (hm) = 100 meters (m)
decameter (dam) = 10 meters (m)
decimeter (dm) = 1/10 meter (m)
centimeter (cm) = 1/1000 meter (m)
millimeter (mm) = 1/1000 meter (m)

Metric Conversion Chart

÷ 1000	÷ 100	÷ 10	to from	x 10	x 100	x 1000
kilometer (km)	hectometer (hm)	dekameter (dam)	**meter (m)**	decimeter (dm)	centimeter (cm)	millimeter (mm)
x 1000	x 100	x 10	to from	÷ 10	÷ 100	÷ 1000

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Study Sheet

Directions: Study the conversion relationships on page 326 and the examples below.

Example: 4 ft = ___?___ in.
Since 1 ft = 12 in., 4 ft x 12 in. = 48 in.

Example: 5,280 ft = ___?___ yd
Since 3 ft = 1 yd, 5,280 ft ÷ 3 ft = 1,760 yd

$$\begin{array}{r} 1760 \\ 3\overline{)5280} \end{array}$$

Directions: Complete the following conversions. Use pencil only. Wrong answers must be corrected so you can use these conversions later.

Convert:

1. ft to in. ft x by ________
2. in. to ft in. ÷ by ________
3. yd to ft yd x by ________
4. ft to yd ft ÷ by ________
5. yd to in. yd x by ________
6. in. to yd in. ÷ by ________
7. mi to ft mi x by ________
8. ft to mi ft ÷ by ________
9. mi to yd mi x by ________
10. yd to mi yd ÷ by ________

Activity Sheet

☞ **Directions**: Compute the following conversions.

A. **Change to inches:**

1. 8 ft ____________
2. 3 1/2 ft ____________
3. 50 ft ____________

B. **Change to feet:**

4. 6 yd ____________
5. 4 2/3 yd ____________

C. **Change to inches:**

6. 9 yd ____________
7. 7 1/2 yd ____________

D. **Change to miles:**

8. 15,840 ft ____________
9. 3,300 ft ____________
10. 8,800 yd ____________

Activity Sheet

☞ **Directions**: Follow the directions below.

A. **Change to inches:**

1. 1 ft 10 in. ____________
2. 5 ft 11 in. ____________
3. 21 ft 7 in. ____________

B. **Change to feet:**

4. 3 yd 1 ft ____________
5. 5 yd 2 ft ____________
6. 35 yd 1 1/2 ft ____________

C. **Change to inches:**

7. 1 yd 2 ft ____________
8. 2 yd 11 in. ____________
9. 1/2 yd ____________

D. **Change to yards:**

10. 7 mi ____________
11. 4 1/2 mi ____________
12. 20 mi ____________

E. **Change to miles:**

13. 3 mi 1,760 ft ____________
14. 12 mi 1,320 ft ____________
15. 450 ft ____________

Activity Sheet

Directions: Convert each of the following as stated.

1. 48 in. = ____________ ft

2. 5 ft 4 in. = ____________ in.

3. 7 ft = ____________ in.

4. 2 yd 9 in. = ____________ in.

5. 72 in. = ____________ yd

6. 27 in. = ____________ ft

7. 4 ft 7 in. = ____________ in.

8. 2 yd 9 in. = ____________ in.

9. 6 yd 5 in. = ____________ in.

10. 108 in. = ____________ ft

11. 42 ft = ____________ yd

12. 6 yd 1 ft = ____________ ft

13. 10 mi 1000 ft = ____________ ft

14. 25 yd = ____________ ft

15. 3,300 ft = ____________ mi

Activity Sheet

Directions: Use the chart on page 333 to convert the following metric measurements.

1. 1 cm = ____________ mm
2. 1 dm = ____________ mm
3. __________ dm = 1 m
4. 1 dam = ____________ m
5. 1 hm = ____________ dam
6. 1 km = ____________ hm
7. __________ cm = 1 dm
8. 1000 m = ____________ km
9. __________ cm = 60 mm
10. 2 dm = ____________ cm

Activity Sheet

Directions: Solve the following problems. Convert before computing when necessary. Refer to the equivalency charts on page 333.

1. 1 ft + 3 ft = ____________ ft

2. 2 yd + 1 ft = ____________ ft

3. 1 mi + 1 ft = ____________ yd

4. 2 ft + 6 in. = ____________ in.

5. 36 in. + 36 in. = ____________ yd

6. 20 dam + 1 dam = ____________ dam

7. 2 m + 10 cm = ____________ cm

8. 1 km + 1 hm = ____________ hm

9. 1 hm + 1 dam + 1000 mm = __________ m

10. 1 dm + 2 m = ____________ cm

Word Problems

Directions: Use the steps on pp. 317-319 to solve the word problems below.

1. The Catson's fence is 60 in. high. What is the height of the fence in feet?
2. Mr. Barton is 6 ft 2 in. tall. How many inches tall is he?
3. Hank threw a baseball 180 feet. How many yards did he throw the ball?
4. It took Sue 3 min 25 sec to run around the block. How many seconds did it take?
5. The capacity of a container is 2 gal 1 qt. What is the capacity in quarts?
6. Miss Copeland bought a 2 lb 8 oz can of shortening. How many ounces of shortening did she buy?
7. An elephant weighs exactly two tons. How much does he weigh in pounds?
8. How many gallons of punch is needed for a party for 20 people, if you plan for each guest to drink 2 – 8 oz cups?
9. The train ride from Chicago to Indianapolis takes 4 hr to go 182 miles. What is the average speed of the train?
10. Jerry exercised three times a week for a year in a class that met for an hour. How much exercise did he get in a year? (Convert to largest unit of time.)

Quiz

☞ **Directions:** Convert the following customary measurements.

1. 1 gal. = __________ qt

2. ______ pt = 1 qt

3. 3 gal. = __________ qt

4. ______ qt = 4 pt

5. 3 tsp = __________ tbsp

6. 1 pt = __________ c

7. 6 tsp = __________ tbsp

8. 4 c = __________ pt

9. 2 qt = __________ gal.

10. 1 gal. = __________ pt

Quiz

☞ **Directions**: Convert the following metric measurements.

1. 100 cL = ____________ L
2. 1 daL = ____________ L
3. 1 cL = ____________ mL
4. 1 kL = ____________ L
5. 1 hL = ____________ L
6. 1 mL = ____________ L
7. 1 daL = ____________ L
8. 1 hL = ____________ daL
9. 1 daL = ____________ mL
10. 1 kL = ____________ hL

Study Sheet

Directions: Study the charts below.

Customary Liquid Measurement

3 teaspoons (tsp) = 1 tablespoon (tbsp)
16 tablespoons = 1 cup (c)
1 cup = 8 fl oz
2 cups = 1 pint (pt)
2 pints = 1 quart (qt)
4 quarts = 1 gallon (gal.)

Metric Liquid Measurement

250 milliliters = 1 metric cup
4 metric cups = 1 liter
1000 milliliters = 1 liter
100 centiliters = 1 liter
10 deciliters = 1 liter
1 dekaliter = 10 liters
1 hectoliters = 100 liters
1 kiloliter = 1000 liters

Metric Conversion Chart

÷ 1000	÷ 100	÷ 10	to from	x 10	x 100	x 1000
kiloliter (kL)	hectoliter (hL)	dekaliter (daL)	**liter L**	deciliter (dL)	centiliter (cL)	milliliter (mL)
x 1000	x 100	x 10	to from	÷ 10	÷ 100	÷ 1000

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Activity Sheet

Directions: Follow the directions below.

A. **Change to ounces:**

1. 7 pt ________
2. 2 pt. 8 oz ________
3. 5 1/2 pt ________

B. **Change to pints:**

4. 3 qt ________
5. 5 qt 1 pt ________
6. 25 qt ________

C. **Change to ounces:**

7. 5 qt ________
8. 3 qt 4 oz ________
9. 26 qt ________

D. **Change to pints:**

10. 48 oz ________
11. 2 pt 4 oz ________
12. 6 oz ________

E. **Change to gallons:**

13. 10 qt ________
14. 2 qt 1 pt ________
15. 64 oz ________

F. **Convert:**

19. 3 liters = ________ milliliters
20. 2 metric cups = ________ milliliters

G. **Change to gallons:**

16. 12 qt ________
17. 56 pt ________
18. 16 gal 2 qt ________

Activity Sheet

Directions: Convert each quantity given below.

Change:

1. 6 pt = ________ qt
2. 15 qt = ________ gal.
3. 5 gal. 3 qt = ________ qt
4. 3 qt 1 pt = ________ pt
5. 3 gal. 2 qt = ________ qt
6. 13 qt = ________ pt
7. 288 oz = ________ qt
8. 11 gal. 2 qt = ________ gal.
9. 8 metric cups = ________ liters
10. 4 liters = ________ metric cups

Activity Sheet

Directions: Convert the quantities below.

1. 7 pt = ________ oz or ________ qt

2. 5 qt 1 pt = ________ pt or ________ gal.

3. 5 qt = ________ oz or ________ pt

4. 2 pt 4 oz = ________ pt or ________ oz

5. 8 gal. = ________ qt or ________ pt

6. 80 oz = ________ pt or ________ qt

7. 56 pt = ________ gal. or ________ qt

8. 8 qt 3 pt = ________ pt or ________ gal.

9. 500 mL = ________ metric cups

10. 5 L = ________ metric cups

11. 12 qt = ________ gal.

12. 1 liter = ________ mL

Quiz

Directions: Convert the following measurements.

1. 1 pound = ________ ounces
2. ________ pounds = 1 ton
3. 32 ounces = ________ pounds
4. 1/4 pound = ________ ounces
5. 8 ounces = ________ pound
6. 1000 pounds = ________ ton
7. ________ milligrams = 1 gram
8. 1 kilogram = ________ grams
9. 100 grams = ________ hectogram
10. ________ decigrams = 1/10 gram

Directions: Solve the following problems. Convert before computing when necessary.

11. 1 pound + 3 ounces = ________ oz
12. 2 tons + 1/2 ton = ________ lb
13. 10 grams x 10 grams = ________ hg
14. 100 grams + 10 grams = ________ kg
15. 2 decigrams + 8 decigrams = ________ g

Study Sheet

Directions: Study the equivalency charts below for customary and metric units of weight/mass.

Customary Weight

16	ounces (oz)	=	1 pound (lb)
2000	pounds (lb)	=	1 ton (T)

Common Metric Equivalents

1000	milligrams	=	1 gram
1000	grams	=	1 kilogram
1000	kilograms	=	1 metric ton

Metric Conversion Chart

÷ 1000	÷ 100	÷ 10	to from	x 10	x 100	x 1000
kilogram (kg)	hectogram (hg)	dekagram (dag)	**gram** **gm**	decigram (dg)	centigram (cg)	milligram (mg)
x 1000	x 100	x 10	to from	÷ 10	÷ 100	÷ 1000

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Activity Sheet

☞ **Directions:** Convert:

1. 4 lb to ounces ________

2. 6 tons to pounds ________

3. 10 tons to pounds ________

4. 48 oz to pounds ________

5. 2 grams to milligrams ________

6. 2000 grams to kilograms ________

7. 5 kilograms to grams ________

8. 10 lb 16 oz to ounces ________

9. 64 oz to lb ________

10. 3 T to lb ________

Activity Sheet

☞ **Directions**: Follow the directions below.

Change:

1. 3 lb to ounces ________

2. 1/4 lb to ounces ________

3. 7 tons to lb ________

4. 6 tons to lb ________

5. 32 oz to lb ________

6. 21 oz to lb ________

7. 4000 lb to ton ________

8. 8000 lb to T ________

9. 1 lb 3 oz to ounces ________

10. 8 oz to lb ________

Activity Sheet

☞ **Directions**: Decide what kind of measure is being used.
Write **W** for weight; **C** for capacity; or **L** for length.

W—Weight C—Capacity L—Length

1. grams ________
2. gallons ________
3. inches ________
4. centimeters ________
5. millimeters ________
6. pounds ________
7. quarts ________
8. yards ________
9. kilograms ________
10. cups ________
11. meters ________
12. pints ________
13. tons ________
14. kilometers ________
15. miles ________
16. feet ________
17. ounces ________
18. liters ________
19. milligrams ________
20. milliliters ________

Activity Sheet

☞ **Directions**: Add and simplify.

A.	1. 17 hr 22 min + 5 hr 38 min	2. 6 da 15 hr + 8 hr	3. 2 yr 3 mo + 3 yr 8 mo
B.	1. 2 ft 9 in. + 11 ft 2 in.	2. 1 mi 2600 ft + 4 mi 2685 ft	3. 2 yd 1 ft 8 in. + 1 yd 2 ft 11 in.
C.	1. 5 gal. 2 qt + 3 gal. 1 qt	2. 2 c 4 oz + 1 c 7 oz	3. 3 gal. 3 qt 1 pt 8 gal. 1 pt + 2 gal. 1 qt 1 pt
D.	1. 4 lb 10 oz + 7 lb 9 oz	2 6 lb 8 oz + 5 lb 10 oz	3. 3 lb 6 oz + 1 lb 8 oz + 6 lb 13 oz

Activity Sheet

Directions: Subtract, converting when necessary, and simplify.

A. 1. $\begin{array}{rr} 10\text{ yr} & 4\text{ mo} \\ - & 7\text{ mo} \\ \hline \end{array}$ 2. $\begin{array}{rr} 3\text{ mo} & 2\text{ wk} \\ -\ 1\text{ mo} & 3\text{ wk} \\ \hline \end{array}$ 3. $\begin{array}{rr} 17\text{ hr} & 30\text{ min} \\ -\ 10\text{ hr} & 28\text{ min} \\ \hline \end{array}$

B. 1. $\begin{array}{rr} 7\text{ ft} & 10\text{ in.} \\ -3\text{ ft} & 7\text{ in.} \\ \hline \end{array}$ 2. $\begin{array}{rr} 28\text{ yd} & \\ -\ 24\text{ yd} & 2\text{ ft} \\ \hline \end{array}$ 3. $\begin{array}{rr} 5\text{ mi} & 100\text{ ft} \\ - & 280\text{ ft} \\ \hline \end{array}$

C. 1. $\begin{array}{rr} 5\text{ qt} & 1\text{ pt} \\ -2\text{ qt} & 1\text{ pt} \\ \hline \end{array}$ 2. $\begin{array}{rr} 1\text{ pt} & 8\text{ oz} \\ - & 14\text{ oz} \\ \hline \end{array}$ 3. $\begin{array}{rr} 6\text{ gal.} & 1\text{ qt} \\ -\ 2\text{ gal.} & 3\text{ qt} \\ \hline \end{array}$

D. 1. $\begin{array}{rr} 9\text{ lb} & 2\text{ oz} \\ -3\text{ lb} & 11\text{ oz} \\ \hline \end{array}$ 2. $\begin{array}{rr} 11\text{ T} & \\ -\ \ 3\text{ T} & 1{,}800\text{ lb} \\ \hline \end{array}$ 3. $\begin{array}{rr} 6\text{ lb} & 13\text{ oz} \\ -\ 3\text{ lb} & 4\text{ oz} \\ \hline \end{array}$

Activity Sheet

Directions: Multiply and simplify.

A.

1. 4 min 12 sec
   x 8
2. 5 yr 3 mo
   x 3
3. 5 hr 20 min
   x 5

B.

1. 5 ft 2 in.
   x 4
2. 4 mi 300 yd
   x 9
3. 2 yd 2 ft 6 in.
   x 4

C.

1. 4 gal. 2 qt
   x 4
2. 1 pt 7 oz
   x 4
3. 2 qt 1 pt
   x 5

D.

1. 2 T 500 lb
   x 9
2. 6 lb 4 oz
   x 8
3. 3 lb 2 oz
   x 6

Activity Sheet

Directions: Match the metric unit to its approximate amount.
Write the correct numeral on each line.

1. 100 kilometers ________ a. about 1 yard

2. 1 liter ________ b. about a teaspoon

3. 5 grams ________ c. the thickness of a dime

4. 1 meter ________ d. a little more than 2 pounds

5. a kilogram ________ e. the width of a thumbtack

6. 1 millimeter ________ f. about 60 miles

7. 1 centimeter ________ g. about the weight of a new pencil

8. 400 grams ________ h. about 1 pound

9. 5 milliliters ________ i. about a quart

10. 1 milligram ________ j. about the weight of a dollar bill

Word Problems

Directions: Solve the following problems using the steps on page 317.

1. After purchasing a 1 qt bottle of vinegar, you use 8 fl oz in a recipe. How much vinegar is left in the bottle?

____

2. John purchased 10 pints of different flavors of yogurt. Has he purchased more or less than a gallon of yogurt?

____

3. Three books weighing 1 lb 5 oz, 2 lb 1 oz and 2 lb 13 oz have been packed in a box weighing 5 oz. What is the total weight of the package?

____

4. Shirley's favorite baseball bat weighs 1 lb. Tom prefers using an 18 oz bat. Whose bat is heavier, and by how much?

____

5. At the Price-Right grocery a shopper can buy raisins in 1 lb boxes for 89¢ each. Also available is a package of eight 2 oz boxes for 98¢. Do these packages contain the same amount of raisins? Which is the better buy?

____

6. One board measures 3 ft 7 in. Another board measures 4 ft. How much longer is the second board?

____

7. If floor boards are 2 in. wide, how many will be required to cover a floor 17 ft wide?

____

8. How many yards of ribbon are needed to make 30 school officer badges if it takes 9 in. of ribbon to make one badge?

____

9. A plane travels 150 meters per second. How many kilometers does it travel in 20 minutes?

____

Word Problems

10. There are three windows in the office. Each window requires 86 cm of fabric for curtains. How many meters of fabric will be needed?

____

11. How many ounces of water must be added to a 6 oz can of frozen lemonade concentrate to make 1 qt of lemonade?

____

12. Lisa parked her car at the airport. When she entered the parking lot, her ticket read 30 NOV 7:35 a.m. How long was her car parked in the parking lot if she picked it up on December 2 at 6:10 p.m.?

____

13. A bus leaves the station every 7 minutes for the center city. If you missed the 10:56 bus, what time is the next scheduled bus?

____

14. If a bus leaves Tallahassee at 5:00 p.m. and arrives in Miami at 4:50 a.m. the following morning, how long does it take to make the trip?

____

15. How many 4 oz bags can be filled from 12 oz of peanuts?

____

16. How many quart bottles can be filled from three 10-gallon cans of milk?

____

17. Mary and her father caught three fish, one weighing 650 mg and another weighing 1.2 mg, and a third weighing 775 mg. What was the total weight of the fish caught, expressed in kilograms?

____

18. Martha worked from 8 a.m. to 4 p.m. five days a week with a half hour lunch break each day. How many hours does she work in one week?

____

19. Derek began his morning deliveries at 7:10 a.m. and finished them at 11:50 a.m. How much time did he spend making the deliveries?

____

UNIT 7: PERIMETER/AREA

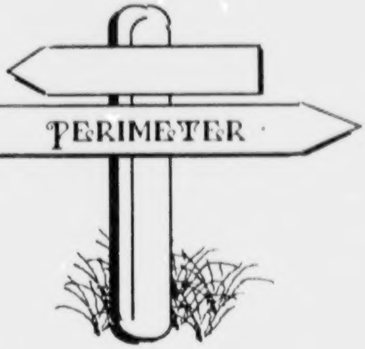
Section 1: Perimeter

Section 2: Area

Section 1

What This Section is About...

In this section you will study and practice finding perimeter for polygons and circumferences of circles.



Suggested Plan

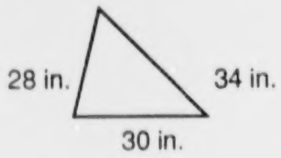
Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Find the perimeter of a polygon 2. Find the circumference of a circle	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Find The Perimeter of a Polygon**

?

How do you find the perimeter of a polygon?

Example 1: Find the perimeter of the polygon shown.



Step 1: Write the formula.

$$P = S_1 + S_2 + S_3$$

Step 2: Substitute numerical values.

$$P = 28 + 30 + 34$$

Step 3: Compute.

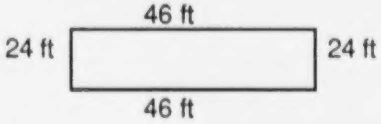
$$P = \begin{array}{r} 28 \\ 30 \\ +\ 34 \\ \hline 92 \end{array}$$

$$P = 92 \text{ inches}$$

Step 4: Convert, if possible.

Solution: $P = 7$ ft 8 in.

Example 2: Find the perimeter of the figure below.



Step 1: Write the formula.

$P = S_1 + S_2 + S_3 + S_4$

Step 2: Substitute numbers.

$P = 46 + 24 + 46 + 24$ or
$(2 \times 46) + (2 \times 24)$

$P = 92 + 48$

Step 3: Compute.

$92 + 48 = 140$

$P = 140$ ft

Step 4: Convert.

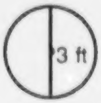
Solution: $P = 46$ yd 2 feet

Concept: Find the Circumference of a Circle

?

How do you find the circumference of a circle?

Example 1: Find the circumference of a circle having a diameter of 3 feet.



Step 1: Write the formula.

$$\boxed{C = \pi d}$$

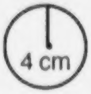
Step 2: Substitute numerical values. Let $\pi = 3.14$.

$$C = 3.14 \times 3'$$

Step 3: Compute.

$$C = 9.42 \text{ ft}$$

Example 2: Find the circumference of a circle having a radius of 4 cm.



Step 1: Write the formula.

$$\boxed{C = 2 \pi r}$$

Step 2: Substitute numerical values.

$$C = (2) \times (4) \times (3.14)$$

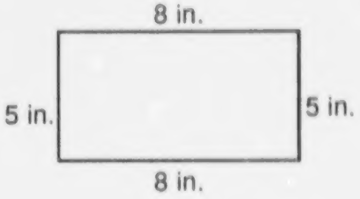
Step 3: Compute.

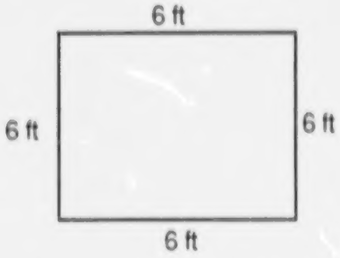
$$2 \times 4 \times 3.14 = 25.12$$

$$C = 25.12 \text{ cm}$$

Quiz

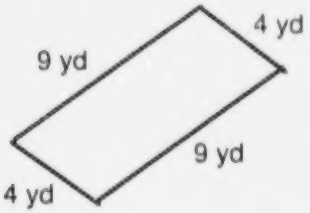
Directions: Find the perimeter of each figure below.
Write each answer in the blank.

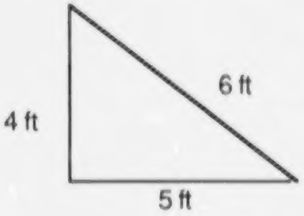

8 in.
5 in.
5 in.
8 in.


6 ft
6 ft
6 ft
6 ft

1. ______________

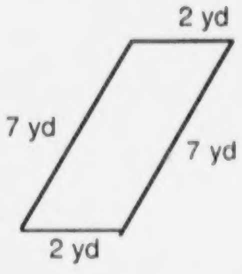
2. ______________

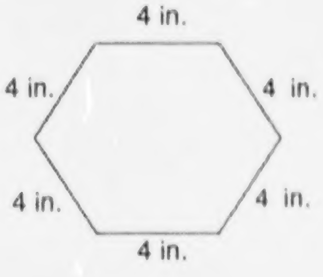

4 yd
9 yd
9 yd
4 yd



3. ______________

4. ______________


2 yd
7 yd
7 yd
2 yd

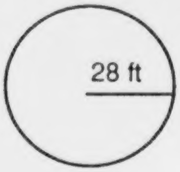

4 in.
4 in.
4 in.
4 in.
4 in.
4 in.

5. ______________

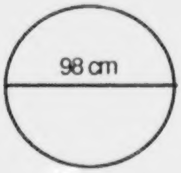
6. ______________

Quiz

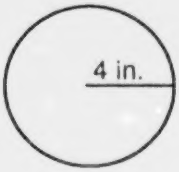
Directions: Find the circumference for figures 1-5.



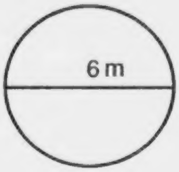
1. ________ ft



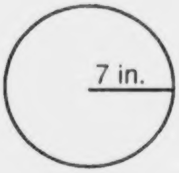
2. ________ cm



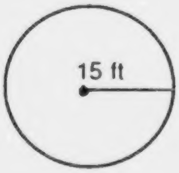
3. ________ in.



4. ________ m



5. ________ in.



6. ________ ft

Vocabulary

☞ **Directions**: Study the words and definitions below.

circle — a set of points in a plane that are all the same distance from a point called the center

circumference — the distance around a circle

diameter — segment that passes through the center of the circle with endpoints on the circle

formula — a general fact or rule expressed by symbols

parallelogram — quadrilateral with opposite sides parallel and equal length

perimeter — the sum of the lengths of the sides of a polygon

pi (π) — a ratio (circumference divided by diameter) pi is approximately 3.14 or 22/7

polygon — closed figure with at least three sides constructed of line segments

quadrilateral — any four-sided polygon

radius — distance from the center of a circle to the circle itself

rectangle — quadrilateral with opposite sides parallel and equal length and all angles 90°

regular polygon — a polygon which has all sides the same length and all angles the same measure

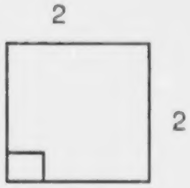
square — quadrilateral with all sides same length and all angles 90°

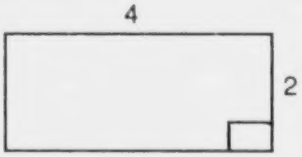
trapezoid — quadrilateral with exactly one pair of parallel sides both called bases

Vocabulary Activity

Directions: Using the words below, identify each of the figures.

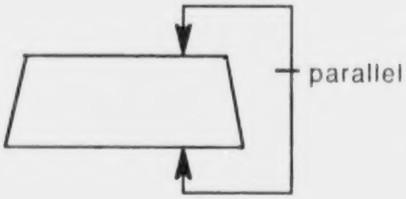
polygon
rectangle
circle
square
quadrilateral
parallelogram
diameter
radius
trapezoid

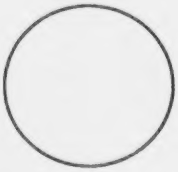




1. ______________

2. ______________

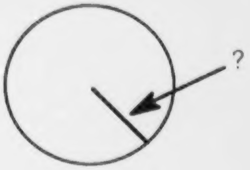


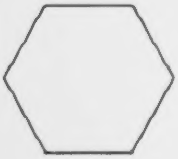


3. ______________

4. ______________

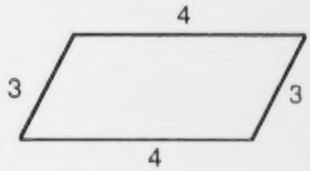
Vocabulary Activity

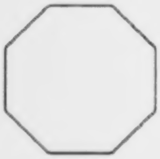




5. ______________

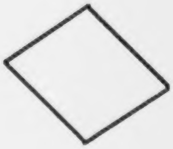
6. ______________

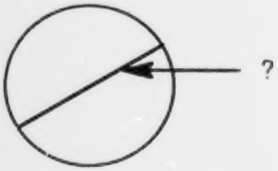




7. ______________

8. ______________





9. ______________

10. ______________

Study Sheet

Directions: Study the formulas below.

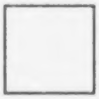
perimeter = the sum of all sides

perimeter = $\text{side}_1 + \text{side}_2 + \text{side}_3 + \text{side}_4$

$P = S_1 + S_2 + S_3$ (triangle)

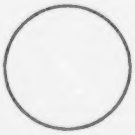
$P = S_1 + S_2 + S_3 + S_4$ (4-sided polygon)

$P = 4s$ (square)



$P = 2l + 2w$ (rectangle)

circumference = the distance around a circle

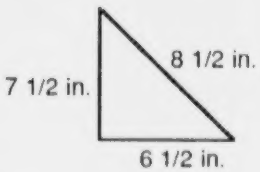


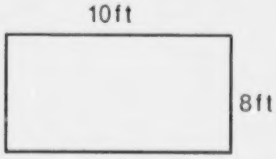
$C = \pi d$

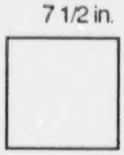
$C = \pi r^2$

Activity Sheet

Directions: Find the perimeter of each figure below.


8 1/2 in.
7 1/2 in.
6 1/2 in.

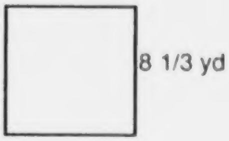


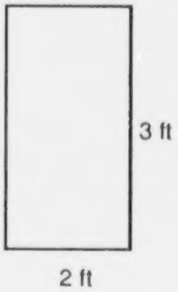


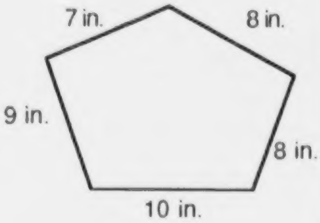
1. ______________ in.

2. ______________ ft

3. ______________ in.



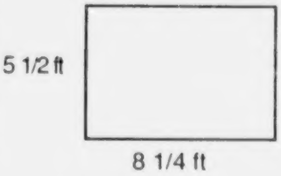


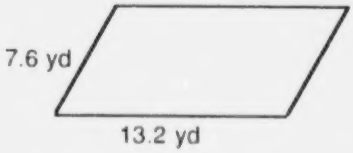

7 in.
8 in.
9 in.
8 in.
10 in.

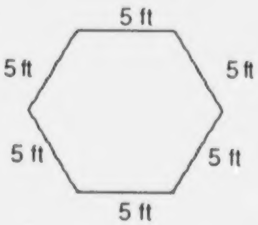
4. ______________ yd

5. ______________ ft

6. ______________ in.


5 1/2 ft
8 1/4 ft




5 ft
5 ft
5 ft
5 ft
5 ft
5 ft

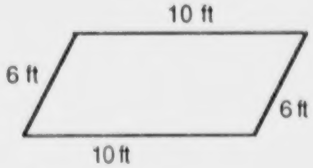
7. ______________ ft

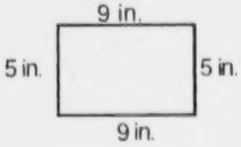
8. ______________ yd

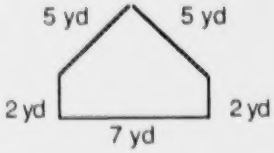
9. ______________ ft

Activity Sheet

Directions: Find the perimeter of each of the figures below.


10 ft
6 ft
6 ft
10 ft

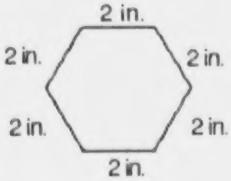

9 in.
5 in.
5 in.
9 in.

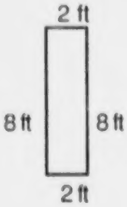

5 yd
5 yd
2 yd
2 yd
7 yd

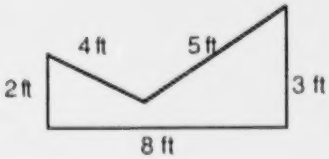
1. ____________ feet

2. ____________ inches

3. ____________ yards


2 in.
2 in.
2 in.
2 in.
2 in.
2 in.

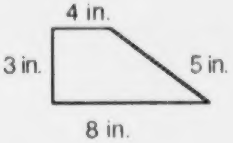

2 ft
8 ft
8 ft
2 ft

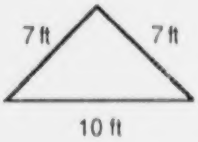

4 ft
5 ft
2 ft
3 ft
8 ft

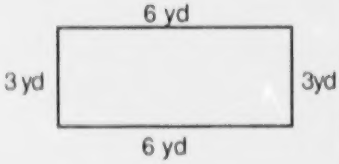
4. ____________ inches

5. ____________ feet

6. ____________ feet


4 in.
3 in.
5 in.
8 in.


7 ft
7 ft
10 ft


6 yd
3 yd
3yd
6 yd

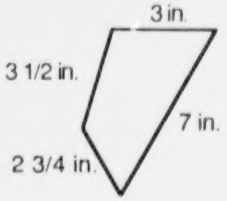
7. ____________ inches

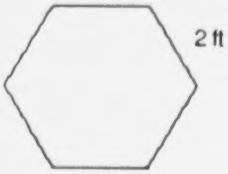
8. ____________ feet

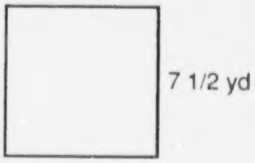
9. ____________ feet

Activity Sheet

Directions: Find the perimeters.


3 in.
3 1/2 in.
7 in.
2 3/4 in.

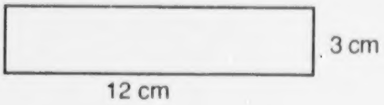


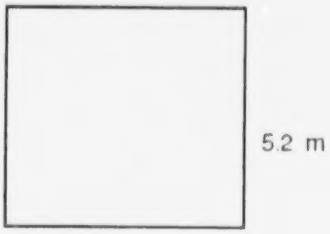


1. ______ in.

2. ______ ft

3. ______ yd





4. ______ cm

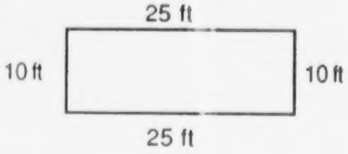
5. ______ m

6. The Jones' Fence Company bid on a job to fence a triangular area. The sides were each 9 2/3 yards long. What was the perimeter?

______

7. How many feet of fencing will be needed to fence this yard?

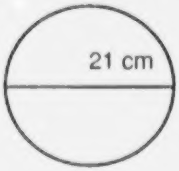
______


25 ft
10 ft
10 ft
25 ft

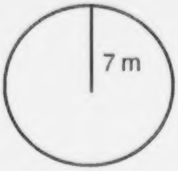
8. A lot is shaped like a rectangle. It is 39 m long and 36 m wide. What is the perimeter? ______

Activity Sheet

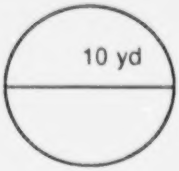
Directions: Find the circumference for each circle. Use 3.14 for π.



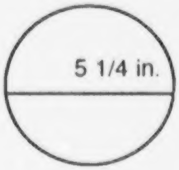
1. ________ cm



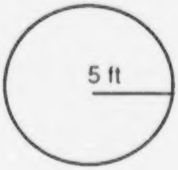
2. ________ m



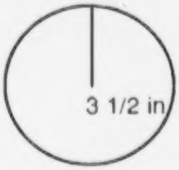
3. ________ yd



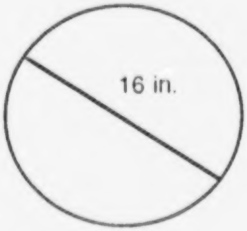
4. ________ in.



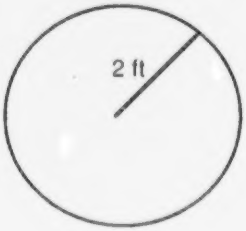
5. ________ ft



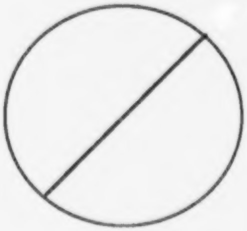
6. ________ in.



7. ________ ft



8. ________ ft

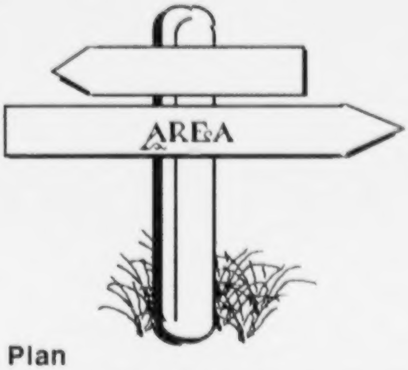


9. ________ yd

Section 2

What This Section is About...

In this section you will practice finding the area of rectangles, triangles, parallelograms, trapezoids, and circles.



Suggested Plan

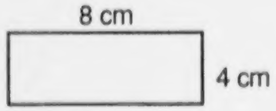
Checkpoints	Activities
✓ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✓ What concepts will be presented? 1. Find the area of a rectangle 2. Find the area of a square 3. Find the area of a triangle 4. Find the area of a parallelogram 5. Find the area of a trapezoid 6. Find the area of a circle	✍ See examples on the following pages.
✓ How much do I already know?	✍ Take Quiz as pretest.
✓ What vocabulary words are introduced?	✍ See Vocabulary.
✓ What practice is provided?	✍ Do Activity Sheets.
✓ What if I need extra help?	✍ Refer to examples in this section.
✓ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Find the Area of a Rectangle**

?

How do you find the area of a rectangle?

Example: Find the area of the rectangle below.



Area = base x height
A = bh

Step 1: Write the formula.

A = bh

Step 2: Substitute the numerical values.

A = 8 cm x 4 cm

Step 3: Compute.

8 x 4 = 32

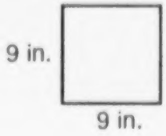
Solution: A = 32 sq cm

Concept: **Find the Area of a Square**

?

How do you find the area of a square?

Example: Find the area of the square below.



$$\boxed{A = s \times s = s^2}$$

Step 1: Write the formula.

$A = s \times s$

Step 2: Substitute the numerical values.

A = 9" x 9"

Step 3: Compute.

$9 \times 9 = 81$

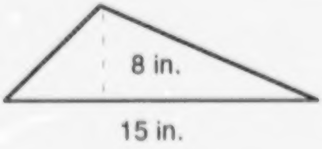
Solution: 81 sq in.

Concept: **Find the Area of a Triangle**

?

How do you find the area of a triangle?

Example: Find the area of the triangle below.



$$\text{Area} = \frac{\text{base} \times \text{height}}{2}$$

$$A = 1/2(bh)$$

Step 1: Write the formula.

$$\textbf{Area} = \mathbf{1/2\ (bh)}$$

Step 2: Substitute numerical values.

$$\text{Area} = 1/2\ (15 \times 8)$$

Step 3: Compute.

$$\text{Area} = \frac{15 \times 8}{2} = \frac{120}{2} = 60$$

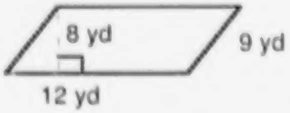
Solution: 60 sq in.

Concept: Find the Area of a Parallelogram

?

How do you find the area of a parallelogram?

Example: Find the area of the parallelogram below.



Area = base x height
A = bh

Step 1: Write the formula.

Area = bh

Step 2: Substitute the numerical values.

$A = 12 \times 8$

Step 3: Compute.

$A = 12 \times 8 = 96$

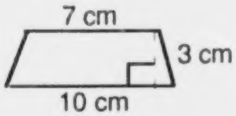
Solution: 96 sq yd

Concept: **Find the Area of a Trapezoid**

?

How do you find the area of a trapezoid

Example: Find the area of the trapezoid below.



$$\text{Area} = \frac{\text{height} \times \text{sum of bases}}{2}$$

$$A = \frac{h\,(b_1 + b_2)}{2}$$

Step 1: Write the formula.

$$A = \frac{h(b_1 + b_2)}{2}$$

Step 2: Substitute the numerical values.

$$\frac{3(7 + 10)}{2}$$

Step 3: Compute.

$$\frac{3(7 + 10)}{2} = \frac{51}{2} = 25.2$$

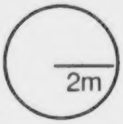
Solution: 25.5 cm^2

Concept: **Finding the Area of a Circle**

?

How do you find the area of a circle

Example 1: Find the area of the circle below.



Area = 3.14 x radius x radius
A = πr^2

Step 1: Write the formula.

Area = πr^2

Step 2: Substitute the numerical values.

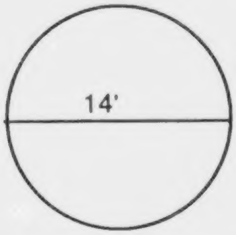
Area = $3.14 \times 2^2 = 3.14 \times 4$

Step 3: Compute.

$$\begin{array}{r} 3.14 \\ \times \quad 4 \\ \hline 12.56 \end{array}$$

Solution: 12.56 m^2

Example 2: Find the area of the circle below.



Area = 3.14 x diameter

$$A = \frac{1}{4}\pi d^2$$

Step 1: Write the formula.

$$A = \frac{1}{4}\pi d^2$$

Step 2: Substitute the numerical values.

$$A = 3.14 \times \frac{1}{4} \times 14' \times 14'$$

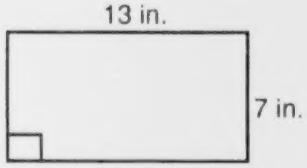
Step 3: Compute.

$$\begin{array}{r} 3.14 \\ \times\ \ 14 \\ \hline 12.56 \\ 314 \\ \hline 43.96 \end{array}$$

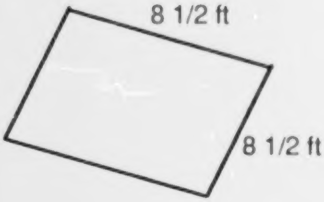
Solution: $A = 43\frac{96}{100}$ sq ft

Quiz

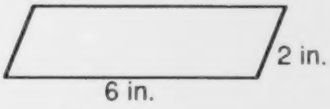
Directions: Find the area of the following figures.



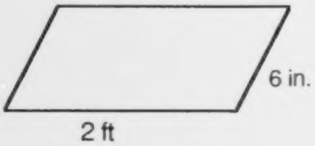
1. ______________ sq in.


8 1/2 ft
8 1/2 ft

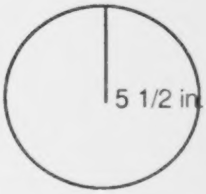
2. ______________ sq ft



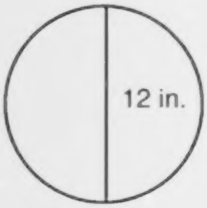
3. ______________ sq in.



4. ______________ sq in.



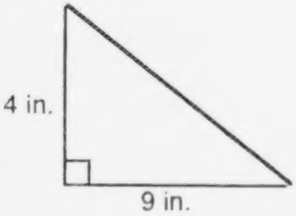
5. ______________ sq in.
(Round to nearest whole number)

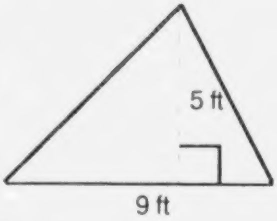


6. ______________ sq in.
(Round to nearest whole number)

Quiz

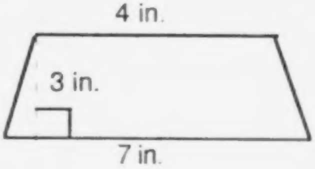
Directions: Find the area of the following figures.

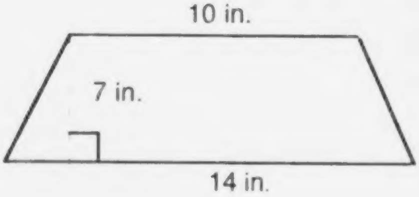




7. ____________ sq in.

8. ______________ sq ft




10 in.
7 in.
14 in.

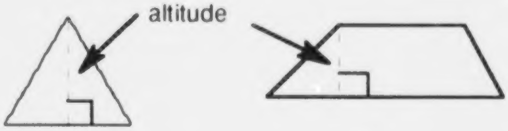
9. ________________ sq in.

10. ________________ sq in.

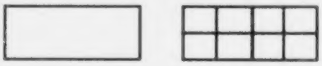
Vocabulary

Directions: Study the words and definitions below.

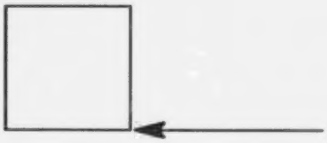
altitude — perpendicular distance from a base to an opposite vertex



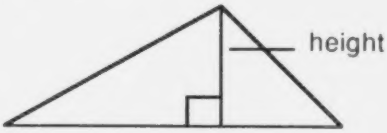
area — the measure of the surface using square units



base — usually the side that the polygon sits on



height — always refers to the vertical height; height measured at a right angle to a given base



Study Sheet

Directions: Study the formulas for area below.

rectangle

$A = bh$ Area = base x height

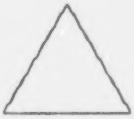
square

$A = s^2$ Area = side x side

parallelogram

$A = bh$ Area = base x height

triangle

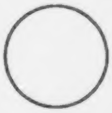


$A = (1/2)bh$ Area = $\frac{\text{base x height}}{2}$

trapezoid

$A = \frac{h(b_1 + b_2)}{2}$ Area = $\frac{\text{height x sum of bases}}{2}$

circle

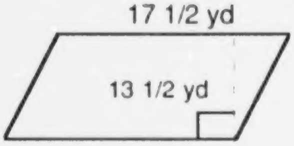


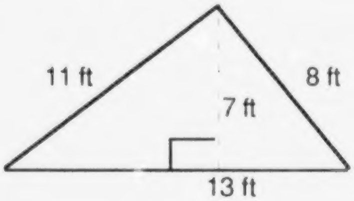
$A = \pi r^2$ Area = 3.14 x radius x radius

$A = \pi d$ Area = 3.14 x diameter

Activity Sheet

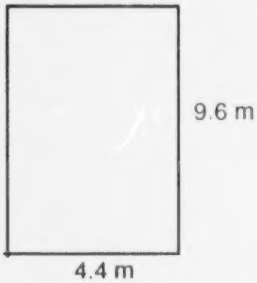
Directions: Find the areas of the following:

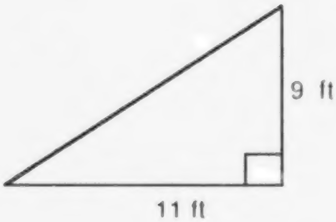

17 1/2 yd
13 1/2 yd


11 ft
8 ft
7 ft
13 ft

1. ____________ sq yd
(round)

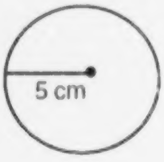
2. ____________ sq ft
(round)

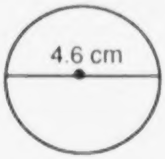




3. ____________ sq m
(round)

4. ____________ sq ft



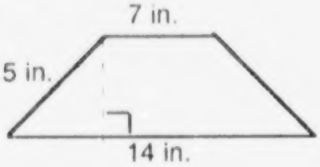


5. ____________ sq cm

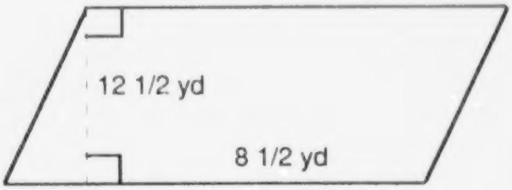
6. ____________ sq cm

Activity Sheet

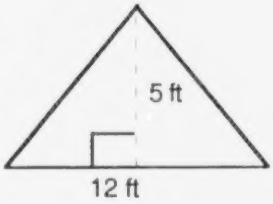
Directions: Find the area of each of the following.


7 in.
5 in.
14 in.

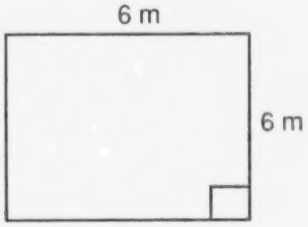
1. __________ sq in.


12 1/2 yd
8 1/2 yd

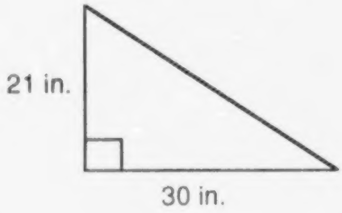
2. __________ sq yd
(Round to whole number)



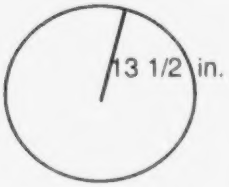
3. __________ sq ft



4. __________ sq m



5. __________ sq in.

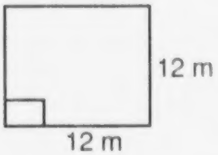


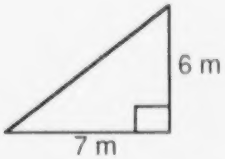
6. __________ sq in.

(Round to whole number)

Activity Sheet

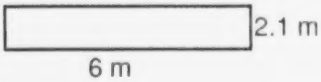
Directions: Find the area of each of the following.

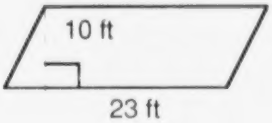




1. ____________ sq m

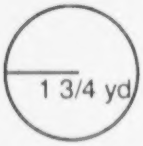
2. ____________ sq cm

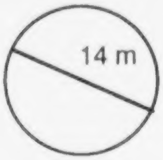




3. ____________ sq m
(Round to whole number)

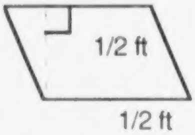
4. ____________ sq ft
(Round to whole number)

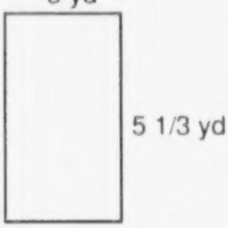




5. ____________ sq yd

6. ____________ sq ft



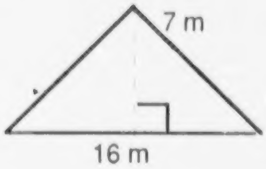


7. ____________ sq ft

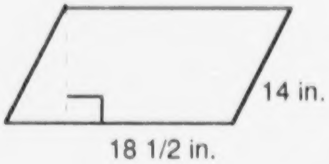
8. ____________ sq yd
(Round to whole number)

Activity Sheet

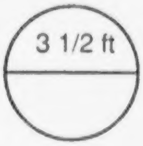
Directions: Find the area of each of the following.



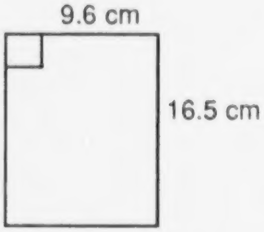
1. ____________ sq m


14 in.
18 1/2 in.

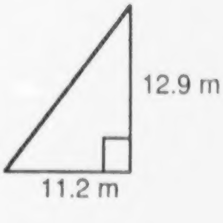
2. ____________ sq in.'



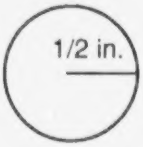
3. ____________sq ft
(Round to nearest whole number)



4. ____________ sq cm
(Round to nearest whole number)



5. ____________ sq m
(Round answer to nearest tenth)



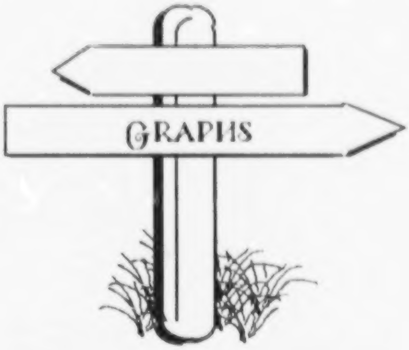
6. ____________ sq in.
(Round answer to nearest hundredth)

UNIT 8: GRAPHS

Unit 8

What This Section is About...

In this unit on graphs you will study how circle, line, and bar graphs are used to provide information in concise forms. You will also interpret and construct circle, line, and bar graphs.



Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Interpret graphs 2. Construct graphs	✍ See example on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

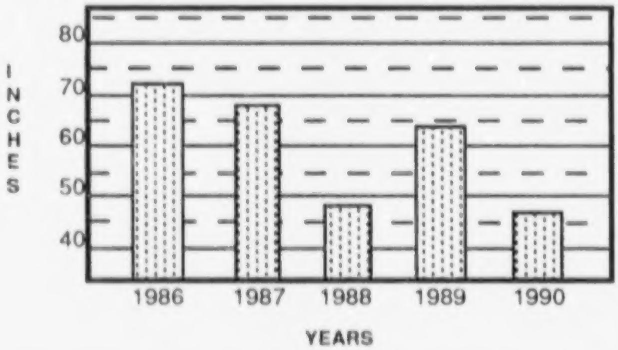
UNIT 8: GRAPHS

Concept: **Interpret Graphs**

?

How do you interpret a bar graph?

Example 1: **Interpret Bar Graphs**



TALLAHASSEE'S ANNUAL RAINFALL

Step 1: Read the title of the graph as a key to its purpose.

The graph above shows Tallahassee's annual rainfall for the past five years.

Step 2: Read the scales, and determine information given and values to be determined from the graph.

In the graph above, in which year did the most rain fall?
Solution: 1986

Step 3: Determine the value which each major unit of the vertical scale represents.

About how many inches of rain fell in 1988?
Solution: 48 inches

Step 4: Compare the length of the bars to determine the relationships.

Step 5: Read the horizontal scale for the type of data provided.

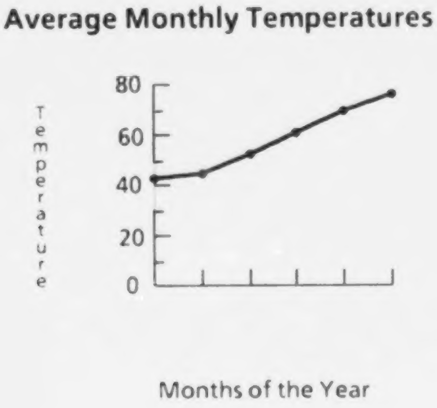
Step 6: Continue to read the other values in the same manner.

Concept: **Interpret Graphs**

?

How do you interpret a line graph?

Example 2: Interpret Line Graphs



Step 1: Determine information given from title and labels.

Solution: Average monthly temperatures

Step 2: Locate the given values on either the horizontal or vertical scale.

Solution: Vertical scale has temperature in increments of 20 degrees.

Step 3: Compare the heights of the points on the line to determine the values and relationships.

Solution: Which month had the highest temperature? June. Which month had the lowest? January.

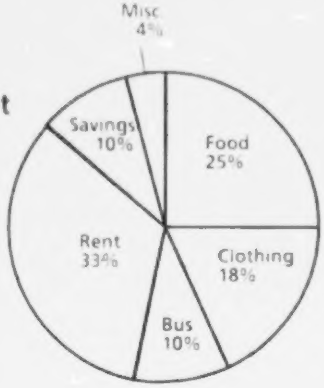
Concept: **Interpret Graphs**

?

How do you interpret a circle graph?

Example 3: Interpret Circle Graphs

Heather's Budget



Step 1: Read the problem carefully to find out what is being asked.

a. *If Heathers income is $15,600 per year, how much is to be spent for each item per year? Per month?*
b. *Compare the percent to be spent for the rent to the percent being saved.*

Step 2: Look at the circle the find the categories and values.

The graph above shows Heather's expenses.

Step 3: Multiply the total quantity by the percent given for each section of the circle graph.

Solution: (a)

			per year		per month
Food	25% of $15.600	is	$3,900	÷ 12 =	$325
Clothing	18% of $15,600	is	$1,560	÷ 12 =	$156
Bus	10% of $15,600	is	$1,560	÷ 12 =	$130
Rent	33% of $15,600	is	$5,148	÷ 12 =	$429
Savings	10% of $15,600	is	$1,560	÷ 12 =	$130
Misc.	4% of $15,600	is	$ 624	÷ 12 =	$52

Solution: (b.) 3 1/3 times as much for rent

UNIT 8: GRAPHS

Concept: **Construct Graphs**

?

How do you construct a bar graph?

Example 1: Construct a *bar* graph showing the following data:

Final grades: English-90; Math-75; Art-95; and Music-63.

Step 1: Decide on a title and the horizontal and vertical scales.

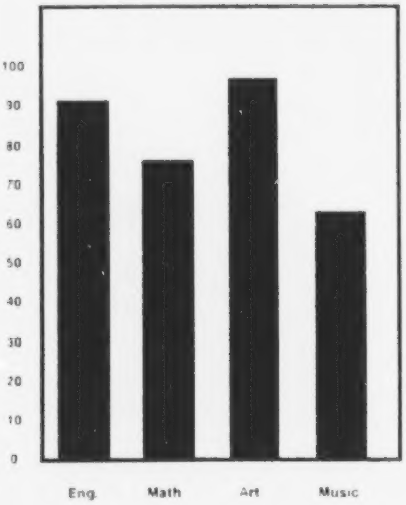
Step 2: Using a ruler, draw the bar graph to scale.

Step 3: Label the values on the scales and identify type of data.

Solution: On the vertical scale, put grades in numerals by tens. On the horizontal scale, list the subjects.

Step 4: Fill in the bars to the appropriate level for each subject.

Final Grades



Concept: **Construct Graphs**

?

How do you construct a line graph?

Example 2: Construct a *line* graph showing the following data:

Correct problems on math tests

Test 1	3
Test 2	5
Test 3	2
Test 4	6
Test 5	7
Test 6	6

Step 1: Draw a graph having a horizontal guide line on the bottom and a vertical guide line on the left side. (May use graph paper.)

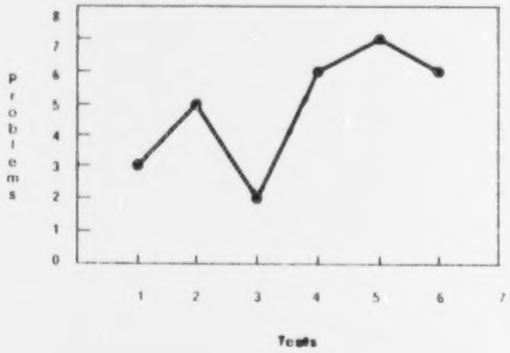
Step 2: Choose a convenient scale for the related numbers, first rounding very large numbers. Write the number scale along one of the guide lines, and label it .

Step 3: Print the numbers of the tests below the other horizontal scale and label (tests).

Step 4: Make a dot at the corresponding location represented by each number in the data list —i.e., at the intersection of Test 1-3, Test 2-5, etc.

Step 5: Select an appropriate title and label the line graph.

Correct Problems Math Tests



Concept: **Construct Graphs**

?

How do you construct a pictograph?

Example 3: Construct a *pictograph* using the following data:

Number of students taking typing

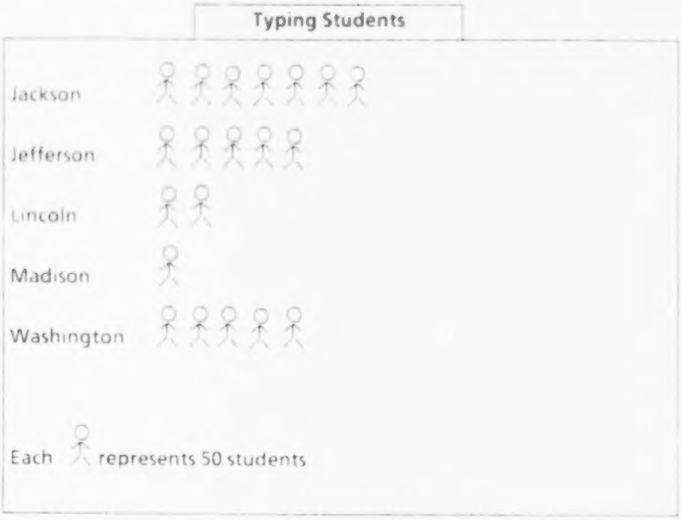
School	No. of Students
Jackson High	350
Jefferson High	150
Lincoln High	100
Madison High	75
Washington High	250

Step 1: Decide how you are going to present the information (one symbol for every 50 students).

Step 2: Choose a scale and a symbol (stick figure).

Step 3: Print the labels, including school names and the numbers for the scale and the title.

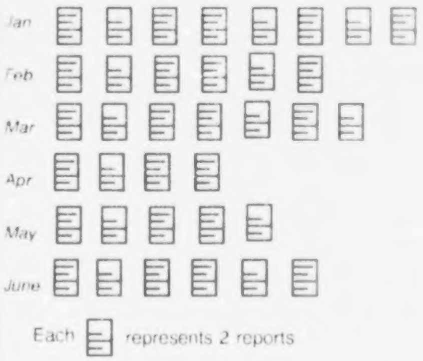
Step 4: Graph the data.



Quiz

Directions: Use the following graphs to answer the questions.

Graph 1



1. How many reports did Sally write in January? ______________

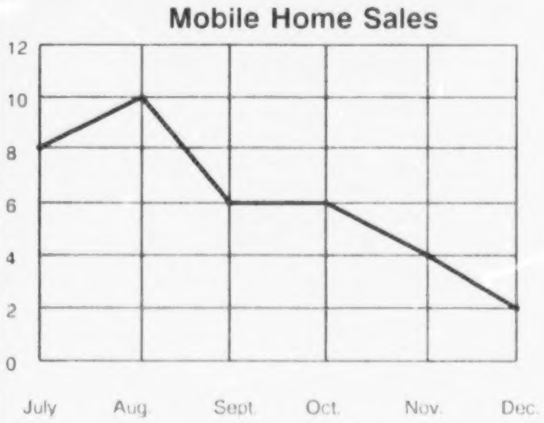
2. Which month did Sally write the greatest number of reports?

   ____

   The least number? __________

3. What was the total number of reports Sally wrote in January, April, and June combined? ____

Graph 2



1. In which months were the sales the same for mobile homes?

   ____

2. Did the sale of mobile homes increase during the last three months of the year? ______________

3. In which month was the greatest number of homes sold? ______________

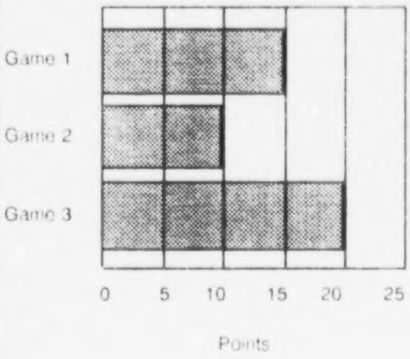
   The least number? ________

Quiz

☞ **Directions:** Use the graphs below to answer the questions.

Graph 3

Record of Points Scored



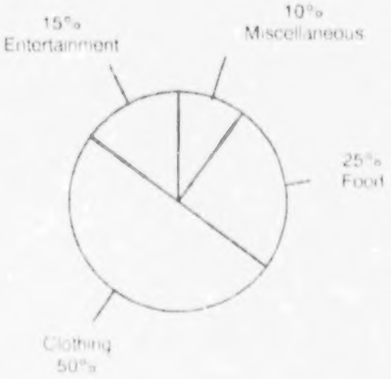
1. How many points were scored in Game 1? ________
2. How many more points were scored in Game 3 than Game 2?

   ____

3. The total score of the three games combined was ______

Graph 4

Allowance



1. What percentage of her allowance does Arlene spend on entertainment?

   ____

2. Of $150.00, what is the amount Arlene would have left after spending her allowance on clothing?

   ____

3. What is the total percentage allowed for entertainment, food, and miscellaneous expenses?

   ____

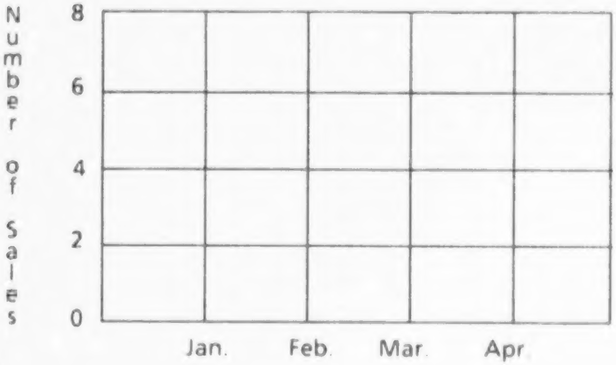
Quiz

Directions: Use the information to make a line graph.

Graph 5

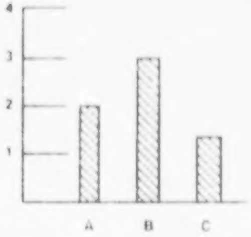
Automobile Sales

Months	Automobile Sales
Jan.	2
Feb.	6
Mar.	4
Apr.	5

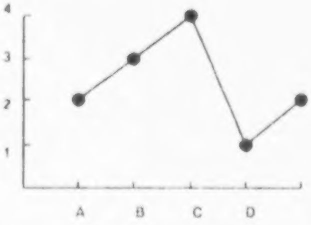


Vocabulary

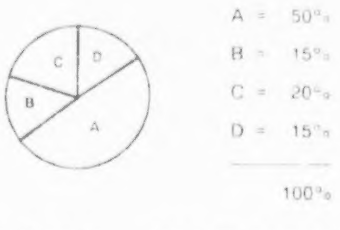
Directions: Study the types of graphs below.



Bar Graph - Used to compare the lengths of lines (bars).



Line Graph - Used to show changes by connecting dots to form a line.

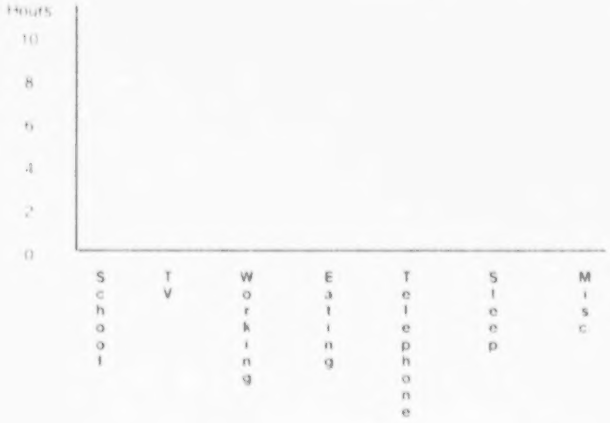


Circle Graph - Used to compare the whole to its individual parts.

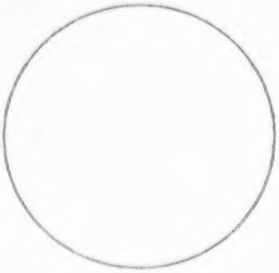
Activity Sheet

Directions: Construct a bar, line, and circle graph using your personal data for each activity listed.

Bar Graph



Circle Graph

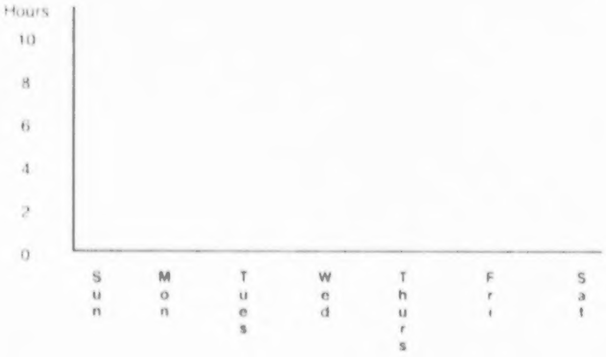


$\frac{\text{Hours}}{24} = \%$

School ________
TV ________
Work ________
Eat ________
Phone ________
Sleep ________
Misc. ________

TOTAL 100%

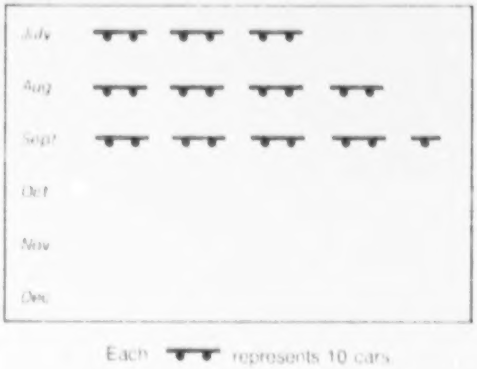
Line Graph



TV Viewing

Activity Sheet

Directions: Use the graphs to answer the questions below.



1. Complete the picture graph using the following table:

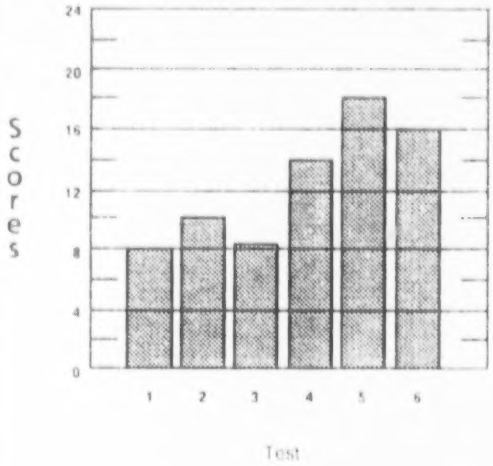
CAR SALES

Month	Cars Sold
October	45
November	15
December	60

2. What is the total number of cars sold from August through November?

____

Scores on Math Tests



3. What is the highest score received?________________

4. On which test did the student receive *twice* the score as on Test 1?

____

Activity Sheet

Directions: Label and complete the graph below.

1. Place these titles in correct locations.

   Average Rainfall

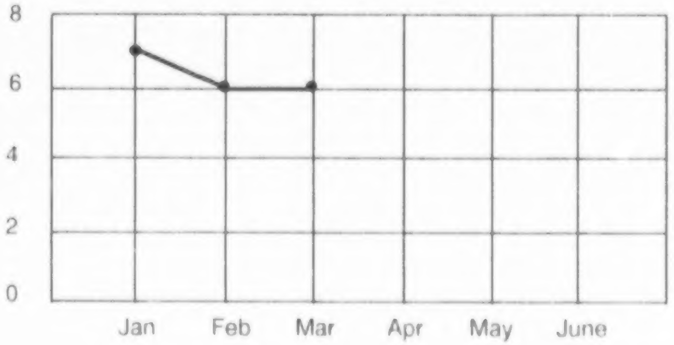
   Inches of Rain

   Months

2. The point (•) for January is drawn to show the average rainfall to be ____________________.

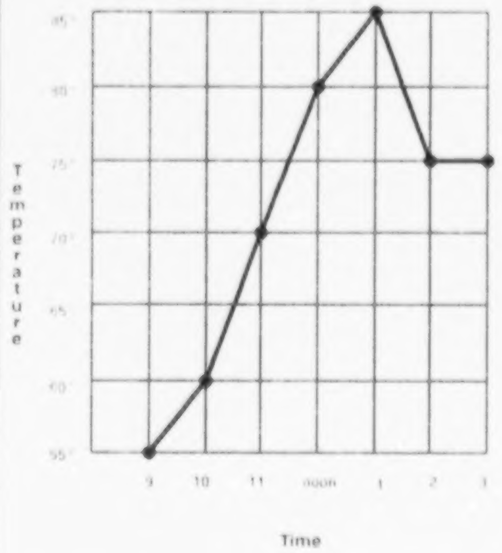
3. Complete the graph using the following:

   Rainfall April - 4 inches
   May - $1\frac{1}{2}$ inches
   June - 0 inches



Activity Sheet

Temperature Changes



1. What does this graph show?

   ____

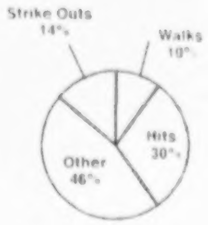
2. This is an example of what type of graph?______________
3. What was the temperature at 11 a.m.?__________________
4. What was the lowest temperature recorded?________

   At what time was it recorded?

   ____

5. How many degrees difference between temperatures from 10 a.m. until 1 p.m.?__________

Record



Item	Number
Hits	
Walks	
Strike outs	
Other	
Total	500

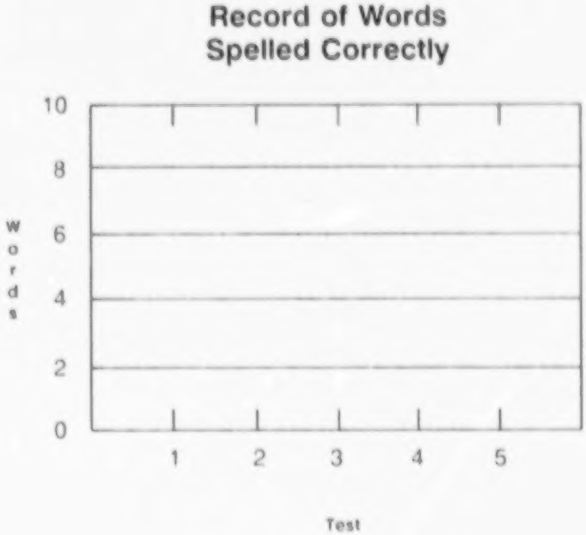
6. This graph shows a player's record for one baseball season.

   Complete the table to show the number of hits, walks, strike outs, etc. (Hint: Take a percentage of the given total for each.)

Activity Sheet

Directions: Use the information below to complete the bar graph.

Test	Words Spelled Correctly
1	8
2	3
3	0
4	6
5	5

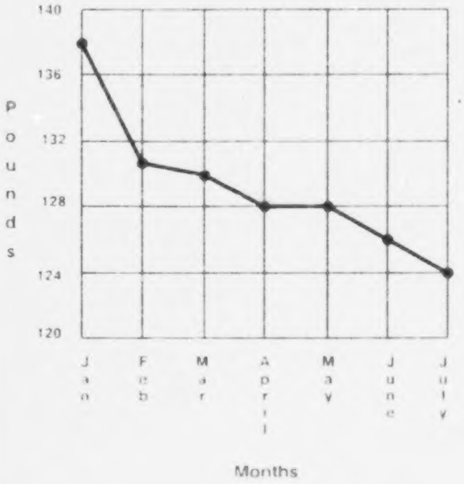


Activity Sheet

Directions: Follow the directions with each graph below.

Graph 1

Weight While Dieting



1. A person recorded his weight on the first day of each month. What was the weight for each month? ______________________

____

____

2. In which months was the same amount of weight lost?

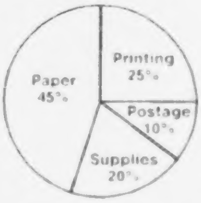
____

3. If the person were to keep dieting and lost the same amount of weight from July 1 to August 1 as from May 1 to July 1, how much would the person weigh?

____

Graph 2

Budget



4. Complete a table to show how much money could be spent on each item of the graph with a $200.00 spending budget.

Item	Amount
________	________
________	________
________	________
________	________

Activity Sheet

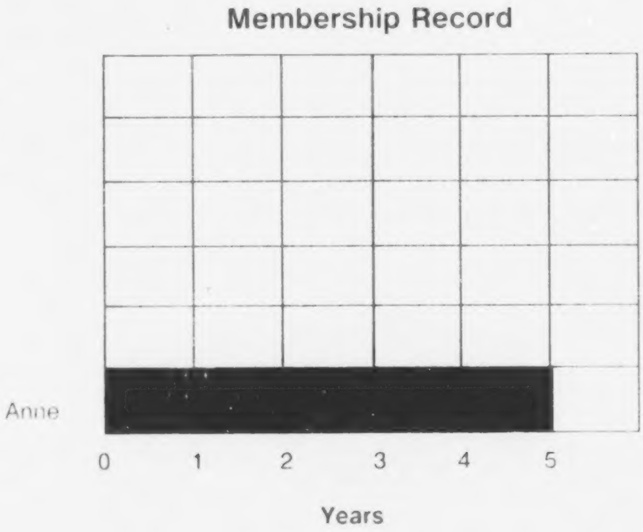
Directions: Complete a horizontal bar graph using the information below:

Graph 3

1. Label the names of "members" in the correct spots on the graph.

2. Show the number of years of membership for each member listed.

Name	Years
Anne	5
Kenn	2
Cathy	$3\frac{1}{2}$
Sue	$\frac{1}{2}$



UNIT 9: CENTRAL TENDENCY

UNIT 9: CENTRAL TENDENCY

Central Tendency

CENTRAL TENDENCY

What This Unit is About...

In this unit you will learn how to look at a set of data for patterns and ways to describe the data. The description of the data will include what are called measures of central tendency. The measures included here are mean, median, mode, and range.

Suggested Plan

Checkpoints	Activities
✓ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✓ What concepts will be presented? 1. Finding the mean 2. Finding the median 3. Finding the mode 4. Finding the range	✍ See examples on the following pages.
✓ How much do I already know?	✍ Take Quiz as pretest.
✓ What vocabulary words are introduced?	✍ See Vocabulary.
✓ What practice is provided?	✍ Do Activity Sheets.
✓ What if I need extra help?	✍ Refer to examples in this section.
✓ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Finding the Mean**

?

How do you find the mean of a set of data?

Example: Find the mean of the following numbers:

72, 61, 80, 62, 72, 73, 56, 78

> The **mean** is the average of a set of numbers.

Step 1: Add the numbers.

$$\begin{array}{r} \left.\begin{array}{r} 72\\ 61\\ 80\\ 62\\ 72\\ 73\\ 56 \end{array}\right\rbrace \text{8 addends}\\ +\ 78\\ \hline 554 \end{array}$$

Step 2: Divide the sum by the number of addends.

$$\begin{array}{r} 69\\ 8\overline{)554}\\ \underline{48}\\ 74\\ \underline{72}\\ 2 \end{array}$$

UNIT 9: CENTRAL TENDENCY

Concept: Finding the Median

?

How do you find the median of a set of data?

Example: Find the median of the following numbers:

98, 72, 64, 85, 68, 89, 92, 75, 78

> The **median** is the middle number in a group of numbers arranged in order of size.

Step 1. Arrange numbers from smallest to largest.

64, 68, 72, 75, 78, 85, 89, 92, 98

Step 2: Locate the middle value.

64, 68, 72, 75, 78, 85, 89, 92, 98

Concept: Finding the Mode

?

How do you find the mode of a set of data?

Example: Find the mode of the following numbers:

56, 61, 62, 72, 72, 73, 78, 80

> The **mode** is the number occurring most frequently in a group of numbers.

Step 1: Count the frequency of occurrences for each value.

Step 2: Locate the most frequently occurring value.

Example: 56, 61, 62, 72, 72, 73, 78, 80

UNIT 9: CENTRAL TENDENCY

Concept: Finding the Range

?

How do you find the range of a given set of data?

Example: Find the range of the following numbers:

12, 19, 18, 12, 11, 10, 15

> The **range** is the difference between the largest and the smallest numbers in the set of numbers.

Step 1: Identify the largest and smallest numbers in the set.

12, ⑲ 18, 12, 11, ⑩ 15

Step 2: Write down the largest number and subtract the smallest number from it. The difference is the range.

$$\begin{array}{r} 19 \\ -\,10 \\ \hline 9 \end{array}$$

Quiz

Directions: Complete the following. (Round numbers to nearest whole number.)

1. Find the **mean** of the following set of scores.

   78, 83, 91, 82, 86 mean__________

2. Find the **mean** for the following set of numbers.

   9, 5, 8, 4, 10, 3, 7, 8, 6, 7, 9, 9, 7, 3, 8, 9

   mean__________

3. Find the **median** for the following sets of numbers.

   a. 6, 7, 8, 9, 5, 6, 0, 5, 6 median__________

   b. 4.2, 5.6, 4.7, 3.8, 4.7, 6.1 median__________

4. Find the **mode** of each of the following sets of numbers.

   a. 11, 15, 10, 19, 15, 11, 12,
   17, 15, 13, 14, 12 mode__________

   b. 49, 34, 57, 53, 55, 34, 57, 53, 34 mode__________

5. Find the **mean, median, mode, and range** for the following set of numbers.

   6, 4, 8, 3, 7, 8, 6, 9, 2, 7, 9, 8, 4, 9, 6, 2

   mean __________ mode __________

   median __________ range __________

Vocabulary

☞ **Directions**: Read and study.

data — factual information used for reasoning, discussion, or calculation

frequency — the number of repetitions

mean — average; quotient of the sum of all items divided by the number of items

median — middle number when the set of data is arranged in order of size

mode — item appearing most frequently. There may be more than one mode or no mode at all.

range — the difference between largest and smallest numbers in a set of numbers

statistics — a branch of mathematics dealing with the collection, analysis, interpretation, and presentation of masses of numerical data

Vocabulary Activity

Directions: Use the vocabulary words to fill in the blanks below.

1. In this unit you are studying a branch of mathematics dealing with the collection of data, which is called __________________ .

2. The factual information collected for analysis is known as ______________ .

3. Numerical data can be described in various ways:

   a) The difference between the smallest and largest numbers in a set is called _______________ .

   b) The middle number in a set of data, arranged in order of size, is called the ____________ .

   c) The average of the numbers in the set of data is called the __________ .

   d) An item (number) that is repeated most frequently in the set is called the _____________ .

   e) The number of times a number is repeated is called the ____________ .

Activity Sheet

☞ **Directions**: Complete the following:

1. Find the **mean** for the following sets of numbers:

a .5, .6, .8, .09, 1, 3, 2 a. ____________ mean

b. 16, 18, 5, 3, 9, 10, 16, 18, 13, 20 b. ____________ mean

2. Find the **mode** for the following sets of numbers:

a. 8, 9, 7, 8, 7, 6, 8, 3, 8, 2, 8 a. ____________ mode

b. 3.1, 2, 3, 1, 0, 5 b. ____________ mode

c. 5, 6.4, 5, 3, 3, 5, 0, 1, 5, 14, 8, 3 c. ____________ mode

3. Find the **median** for the following sets of numbers:

a. 16, 15, 3, 16, 15, 4, 2,
1, 3, 15, 3, 16, 0 a. ____________ median

b. 3.2, 3.3, 4, 0, 1, 3.1, 4.1, 4, 3.2 b. ____________ median

c. 10, 15, 30, 40, 80, 90 c. ____________ median

Activity Sheet

Directions: Complete. (Round answers to tenths.)

1. Find the **mode** for the following sets of numbers:

a 72, 61, 80, 62, 72, 73, 58, 78 a. ________ mode

b. 8, 7, 5, 6, 9, b. ________ mode

2. Find the **median** for the following sets of numbers:

a. 7, 9, 10, 10, 4, 6, 3, 6, 6, 8, 9 a. ________ median

b. 13, 12, 3, 7, 8, 12 b. ________ median

3. Find the **mean** for the following sets of numbers:

a. 75°, 73°, 65°, 75°, 74°, 68°, 65° a. ________ mean

b. 3.1, 4, 0, 2.5, 7, 3.6, 5 b. ________ mean

Activity Sheet

Directions: Find the **mean**, **median**, and **mode** for the following sets of numbers. Show work. (Round answers to tenths.)

1. 0, 1, 2, 3, 4, 5, 6

mean a. ____________

median b. ____________

mode c. ____________

2. .5, .6, 1.1, .5, 2.1, 3

mean a. ____________

median b. ____________

mode c. ____________

3. 21, 23, 19, 17, 21, 18, 22, 18, 17, 23, 18, 23, 16, 23

mean a. ____________

median b. ____________

mode c. ____________

4. 8, 7, 8, 9, 7, 6, 5, 7, 8, 4, 8, 9, 6, 9, 2, 9

mean a. ____________

median b. ____________

mode c. ____________

Activity Sheet

☞ **Directions**: Complete.

Find the **mean** for the following sets of numbers:

1. 83, 91, 78, 86, 84 mean ____________

2. .6, .8, .6, .9, .3, .2 mean ____________

3. 21, 22, 24, 19 mean ____________

Find the **median** of the following sets of numbers:

4. .2, 3.1, 0, 5 median ____________

5. 8, 9, 7, 8, 6, 8, 2, 1 median ____________

6. 21, 22, 21, 22, 21, 22, 22, 21 median ____________

Find the **mode** of the following set of numbers:

7. 14, 15, 3, 2, 8, 7, 14, 8, 2
3, 8, 14, 16, 2, 3, 15, 2 mode ____________

Find the **mean, median**, and **mode** for the following set of temperatures:

78°, 76°, 64°, 63°, 70°, 75°, 76°, 60°

8. mean ____________

9. median ____________

10. mode ____________

Activity Sheet

☞ **Directions:** Find the **mean** of the following sets of numbers.

1. 83, 91, 78, 86, 84 ____________ mean

2. .6, .8, .6, .9, .3, .2 ____________ mean

3. 21, 22, 24, 19 ____________ mean

☞ **Directions:** Find the **median** of the following sets of numbers.

4. 2, 3.1, 0, 5 ____________ median

5. 8, 9, 7, 8, 6, 8, 3, 2, 1 ____________ median

6. 21, 22, 21, 22, 21, 22, 22, 21 ____________ median

Activity Sheet

Directions: Find the **mode** of the following sets of numbers.

7. 14, 15, 3, 2, 8, 7, 14, 8, 2, 3, 8, 14, 16, 2, 3, 15, 2

_________ mode

8. 94, 78, 85, 97, 65, 72, 85, 92, 98, 63, 72, 69, 85, 95, 93

_________ mode

Directions: Find the **range** of the following sets of numbers.

9. 6, 4, 8, 3, 7, 8, 6, 9, 2, 5

_________ range

10. 42, 47, 49, 43, 45, 47, 48

_________ range

Directions: Find the **mean, median, mode,** and **range** of the following sets of temperatures.

78°, 76°, 64°, 63°, 70°, 75°, 76°, 60°

11. mean _________
12. median _________
13. mode _________
14. range _________

UNIT 10: INTEGERS

Section 1: Addition
Section 2: Multiplication

Section 1

What This Section is About...

In this unit you will learn how to solve problems with integers. An integer is any whole number, or its opposite, and zero. You will learn how to add integers in Section 1.

Suggested Plan

Checkpoints	**Activities**
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented?	✍ See examples on the following pages.
• Addition of integers	
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: **Addition of Integers**

?

How do you add integers?

Example 1: Add $5 + 5$

Step 1: Look at the signs. Both are positive. (Remember: *no* sign is the same as a positive sign.)

Step 2: Add and write the common sign in the answer.

$$5 + 5 = 10$$

Example 2: Add

$$\begin{array}{r} {}^{-}5 \\ \underline{+3} \end{array}$$

Step 1: Look at the signs. One is negative; one is positive.

Step 2: Subtract and take the sign of larger number.

$$\begin{array}{r} {}^{-}5 \\ \underline{+3} \\ {}^{-}2 \end{array}$$

Example 3: Add ${}^{-}5 + {}^{-}5 =$

Step 1: Look at the signs. Both are negative.

Step 2: Add and write the common sign.

$${}^{-}5 + {}^{-}5 = {}^{-}10$$

Example 4: Add $(^-6) + (9) =$

Step 1: Look at the signs. One is negative; one is positive.

Step 2: Subtract and write the sign of the larger number in the answer.

$$(^-6) + (9) = 3$$

Review: Look at the signs.

Alike: Add and write the common sign.

Different: Subtract and write the sign of the larger number.

Quiz

Directions: Answer each question below.

1. What are integers?

2. State the rules for adding integers.

3. Define absolute value.

4. What are negative numbers?

5. Add:

$$\begin{array}{r} ^{+}3 \\ \underline{^{+}2} \end{array} \quad \begin{array}{r} ^{-}3 \\ \underline{^{-}2} \end{array} \quad \begin{array}{r} ^{+}6 \\ \underline{^{+}8} \end{array} \quad \begin{array}{r} ^{-}5 \\ \underline{^{-}5} \end{array} \quad \begin{array}{r} ^{-}10 \\ \underline{+\ 2} \end{array} \quad \begin{array}{r} ^{+}2 \\ \underline{^{-}10} \end{array}$$

6. Add: $(^{-}3) + (^{-}7) + (^{-}5) + (^{+}3) + (^{-}6) + (^{+}2) + (^{+}7) =$

7. On which side of zero (on the number line) do negative values appear?

____

8. Is zero negative or positive? _______________

Vocabulary

Directions: Read and study.

absolute value — the number without its sign (example: absolute value of ${}^{-}8$ is 8)

common signs — two or more integers having the same sign

integers — the set of whole numbers together with their opposites; signed numbers $\{\ldots{}^{-}3, {}^{-}2, {}^{-}1, 0, {}^{+}1, {}^{+}2, {}^{+}3\ldots\}$

negative — having a value less than zero

opposite — additive inverse; when a number is added to its opposite the result is zero; opposites come in pairs

Examples: 4 is the opposite of ${}^{-}4$ $(4 + {}^{-}4 = 0)$
${}^{-}7$ is the opposite of 7 $({}^{-}7 + 7 = 0)$

positive — having a value greater than zero

sign — one of two symbols (+, −) used to label a numeral, to identify its value as positive or negative

Activity Sheet

Directions: Follow the directions below.

1. Fill in the blanks:

   a. When the signs are alike you ______________ the two numbers and use the ______________ sign with the answer.

   b. When the signs are *not* alike you ________________ the two numbers and use the __________ of the ________________ number (absolute value) with the answer.

2. Add:

a.	+8	b.	−3	c.	+17	d.	−18	e.	−20
	+2		−2		+16		2		−5
f.	−16	g.	−88	h.	+82	i.	63	j.	8
	+3		+10		−15		−6		8
k.	−32	l.	−8	m.	55	n.	39	0.	8
	+11		−21		66		−8		−39

3. Add:

   a. (−8) + (−2) + (−5) = ________________

   b. (−16) + (−5) + (2) = ________________

   c. (−3) + (+2) + (−5) = ________________

Activity Sheet

☞ **Directions:** Follow the directions below.

1. There are two possible signs that an integer can have. What are they?

   ______________ and ______________

2. How can you indicate an integer is positive, if you do not wish to write the sign (+)? Show example here: ________________

3. Solve:

   a. $(+3) + (-2) + (+6) =$ ________________

   b. $(-8) + (-2) + (+3) =$ ________________

   c. $(-2) + (-8) + (-5) + (+8) =$ ________________

   d. $(-111) + (21) + (18) + (-100) =$ ________________

   e. $(42) + (6) + (-40) + (-8) =$ ________________

   f. $(37) + (-37) + (37) =$ ________________

   g. $(48) + (-49) + (-7) =$ ________________

   h. $(-75) + (-4) + (-21) =$ ________________

Activity Sheet

Directions: Read each statement below.
Write **T** for True and **F** for False on each line.

_____ 1. When you are adding integers and the signs are the same, use the sign of the smaller integer with the answer.

_____ 2. Zero is neither positive nor negative.

_____ 3. The answer is always positive when you add.

_____ 4. The answer is always negative when you add.

_____ 5. You cannot determine the sign of the sum until you see the result when adding.

_____ 6. Zero is larger than –1.

_____ 7. Zero is larger than –10.

_____ 8. Negative numbers are to the left of zero on a number line.

_____ 9. The absolute value of negative ten is ten (10).

_____ 10. Absolute value can be treated as if it is positive.

Solve:

11. $\begin{array}{r} +1 \\ \underline{+2} \end{array}$ 12. $\begin{array}{r} -4 \\ \underline{-3} \end{array}$ 13. $\begin{array}{r} +5 \\ \underline{-6} \end{array}$ 14. $\begin{array}{r} -8 \\ \underline{+7} \end{array}$ 15. $\begin{array}{r} +10 \\ \underline{+9} \end{array}$

16. $\begin{array}{r} +11 \\ +12 \\ \underline{+13} \end{array}$ 17. $\begin{array}{r} -14 \\ -15 \\ \underline{-16} \end{array}$ 18. $\begin{array}{r} +17 \\ -18 \\ \underline{+19} \end{array}$ 19. $\begin{array}{r} -20 \\ +21 \\ \underline{-22} \end{array}$ 20 $\begin{array}{r} -23 \\ +24 \\ \underline{+25} \end{array}$

Activity Sheet

☞ **Directions**: Fill in the blanks.

1. If I gain 4 yd and then gain 5 yd, I ____________
have/have not.
made a first down in football. I am _____ yd ________
short/over.

2. If I gain 5 yd, lose 4 yd, and then gain 10 yd on three plays, I
__________ made a first down. I am _____ yd ________
have/have not short/over.

3. If I use (+) to show a gain and (−) to show a loss, how far does the ball travel (total) on the following football plays?

+3, −2, −1, +6, −5, −2, +1.

4. Set up the part of the number line from −5 to +15.

____

Note: First down equals ten yards.

Activity Sheet

Directions: Add the integers.

a. +9 +9	b. −9 −8	c. +7 −9	d. −96 +95
e. −93 −94	f. +92 +91	g. 90 83	h. 82 89
i. 87 −81	j. −80 −86	k. −85 79	l. −84 +78

m. 5 + −9 + −5 + 8 = ____________

n. 5 + 7 + 5 + 6 = ____________

o. (−5) + (−5) + 5 + 4 = ____________

p. 53 + −5 + 2 = ____________

q. −5 + 1 + 4 + 9 = ____________

r. −48 + 4 + 7 = ____________

s. 46 + (−45) + (−44) = ____________

Section 2

What This Section is About...

In this unit you will learn how to solve problems with integers. An integer is any whole number, or its opposite, and zero. You will learn how to multiply integers in Section 2.

MULTIPLICATION

Suggested Plan

Checkpoints	Activities
✓ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✓ What concepts will be presented? • Multiplication of integers	✍ See example on the following page.
✓ How much do I already know?	✍ Take Quiz as pretest.
✓ What vocabulary words are introduced?	✍ See Vocabulary.
✓ What practice is provided?	✍ Do Activity Sheets.
✓ What if I need extra help?	✍ Refer to examples in this section.
✓ Have I mastered these concepts?	✍ Take Quiz as posttest.

Concept: Multiplication of Integers

?

How do you multiply integers?

Example 1: Multiply +5 x +4

Step 1: Look at the signs. The signs are **alike**. The answer will be **positive**.

Step 2: Multiply and write the answer as **positive**.

+5 x +4 = +20

Example 2: Multiply −27 x 3

Step 1: Look at the signs. The signs are **different**. The answer will be negative.

Step 2: Multiply and write the answer as **negative**.

−27 x 3 = −71

Example 3: Multiply −27 x −3 =

Step 1: Look at the signs. The signs are the **same**. The answer will be positive.

Step 2: Multiply and write the answer as **positive**.

−27 x −3 = +71

Note: When you have a string of positive factors, the sign of the product can be easily determined by counting the number of negative factors. If the count is even, the product is positive; if the count is odd, the product is negative.

Quiz

☞ **Directions**: Fill in each blank with the correct answer.

1. When multiplying two integers, the sign of the answer is ____________________ if the signs of the integers are alike, and ____________________ if the signs are not alike.

2. Multiplication and ____________________ of integers do *not* have the same rules.

3. A dot (•) between factors means to ____________________.

4. An **x** between factors means to ____________________.

5. Enclosing factors in parentheses means to ____________________.

6. Putting one number inside the parentheses and the other outside, with no operational sign printed between them, means to ____________________.

7. $(^{-}3)\,(5) =$ __________

8. $(^{-}2)\,(^{-}6) =$ __________

9. $(5)\,(^{-}3)\,(^{-}2) =$ __________

10. $(4)\,(^{-}6)\,(^{-}3) =$ __________

11. $(3)\,(^{-}2)\,(^{-}1)\,(^{-}1)\,(^{-}5) =$ __________

12. $(5)\,(^{-}2)\,(0)\,(9) =$ __________

Activity Sheet

☞ **Directions**: Fill in each blank with the correct answer.

1. The product of a positive and a positive results in a ____________.
2. A positive times a negative gives a ____________.
3. The product of two negative integers gives a ____________.
4. Positive two (+2) times negative three (−3) gives a product of negative (−6) because the ____________ of the factors are ____________________.
5. The sign of the product for this problem: (−2) (−3) (16) (−221) (74) (−33) (41) can be determined by counting the number of ______________ factors. The sign in this case will be ____________.

6. (−3) • (−3) = __________ 7. (−5) (2) = __________

8. 16 x 2 = __________ 9. −16 x −2 = __________

10. (25) (−3) = __________ 11. 14 • 2 • −1 • 0 = __________

12. 5 • (−11) = __________ 13. (3) (−2) (−5) (−1) = __________

☞ **Directions**: Determine only the *sign* for the final products.

14. (5) (0) (−1) (2) (−6) (−5) = __________
15. (2) (−6) (−5) (5) (−1) = __________
16. −3 • 4 • 2 • −5 = __________

Activity Sheet

Directions: Fill in the blank with the correct answer.

1. If the factors are both positive, the answer will be ____________________.

2. If the factors are both negative, the answer will be ____________________.

3. If one factor is positive and the other is negative, the answer will be ________________.

4. If the number of the negative factors is even, the sign of the product will be ________________.

Directions: Compute.

5. $(^-3)\ (^-11)$ = ____________

6. $(5)\ (^-3)$ = ____________

7. $25 \times (^-5)$ = ____________

8. $(^-30)\ (2) \cdot (^-10)$ = ____________

9. $(5)\ (^-2)\ (-3)\ (^-1)$ = ____________

10 $(2)\ (^-2)\ (2)\ (2)\ (^-2)\ (^-2)$ = ____________

Activity Sheet

☞ **Directions**: Fill in the blank with the correct answer.

1. In multiplication, if the signs are alike, the answer is ____________________.

   If the signs are not alike, the answer is ________________.

2. The rules deal with only ____________________ integers at the time, except for the shortcut rule in multiplication.

☞ **Directions**: Determine the sign for each *product*.

3. (+) (+) = ___________

4. (+) (–) = ___________

5. (–) (–) = ___________

6. (–) (+) = ___________

7. (+) (+) = ___________

8. (–) (–) = ___________

9. (+) (–) = ___________

10. (–) (–) = ___________

11. (+) (+) = ___________

12. (–) (+) = ___________

13. (–) (–) = ___________

14. (+) (–) = ___________

15. (+) (–) (–) (+) (–) (+) (–) (–) (–) (+) (+) (–) = ___________

16. $(^-3)\,(^-10)$ = ___________

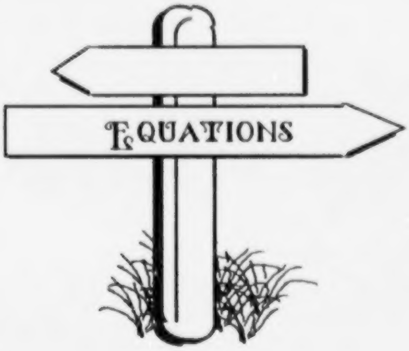
UNIT 11: EQUATIONS

UNIT 11: EQUATIONS

Unit 11

What This Unit is About...

In this unit you will learn the procedures used to solve simple equations. The equations will involve addition or multiplication, or a combination of addition and multiplication.



Suggested Plan

Checkpoints	Activities
✔ Do I have the necessary prerequisite skills?	✍ Take Quiz.
✔ What concepts will be presented? 1. Solve equations of the form $ax = b$ 2. Solve equations of the form $x + a = b$ 3. Solve equations of the form $ax + b = c$	✍ See examples on the following pages.
✔ How much do I already know?	✍ Take Quiz as pretest.
✔ What vocabulary words are introduced?	✍ See Vocabulary.
✔ What practice is provided?	✍ Do Activity Sheets.
✔ What if I need extra help?	✍ Refer to examples in this section.
✔ Have I mastered these concepts?	✍ Take Quiz as posttest.

UNIT 11: EQUATIONS

Concept: **Solving Equations of the Form $ax = b$**

?

How do you solve equations of the form

$ax = b$?

Example: Find x when $a = -4$ and $b = 8$ in the equation $ax = b$.

Step 1: Write the equation.

$$-4x = 8$$

Step 2: Isolate x by dividing both sides of the equation by the "*a*" value (−4).

$$-4x = 8$$

$$\frac{-4x}{-4} = \frac{8}{-4}$$

Suggestion: "x" must be isolated, so use the opposite operation. Since −4x means −4 multiplied by x, the opposite operation is division.

$$\begin{array}{ccc} \underline{-4x} & = & \underline{8} \\ -4 & = & -4 \end{array}$$

and say, "If I divide the left side of the equation by −4, I must also divide the right side of the equation by −4."

$$\frac{-4x}{-4} = \frac{8}{-4}$$

and say, "Since $-4 \div -4 = 1$, I can think of $-4x \div -4$ as x, therefore $x = 8 \div -4$."

$$x = \frac{8}{-4}$$

Step 3: Compute:

$$x = \frac{-8}{-4}$$

$$x = -2$$

Step 4: Check by substituting for x, and computing.

$$-4x = 8$$
$$-4(-2) = 8$$
$$8 = 8$$

Concept: **Solve Equations of the Form x + a = b**

?

How do you solve equations of the form $x + a = b$?

Example: Find x when $x + 36 = 100$.

Step 1: Write the equation.

$$x + 36 = 100$$

Step 2: Isolate x by adding the opposite of the "b" value (36) to both sides of the equation.

$$x + 36 = 100$$
$$x + 36 + -36 = 100 + -36$$

Step 3: Compute:

$$(x + 0) = 64$$

$$x = 64$$

Step 4: Check by substituting for x, and computing.

$$\begin{aligned} x + 36 &= 100 \\ 64 + 36 &= 100 \\ 100 &= 100 \end{aligned}$$

Concept: **Solve Equations of the Form $ax + b = c$**

?

How do you solve equations of the form $ax + b = c$?

Example: Find x if $2x + 4 = 6$.

Step 1: Write the equation.

$$2x + 4 = 6$$

Step 2: a) Isolate x. Add the opposite value of "*b*" (4) to both sides of the equation. Compute.

$$\begin{aligned} 2x + 4 &= 6 \\ 2x + 4 + {}^{-}4 &= 6 + {}^{-}4 \\ 2x &= 2 \end{aligned}$$

b) Divide by the value of "*a*" (2) on both sides of the equation. Compute.

$$2x = 2$$

$$\frac{2x}{2} = \frac{2}{2}$$

$$x = 1$$

Step 3: Check by substituting the value for *x*.

$$\begin{aligned} 2x + 4 &= c \\ 2(1) + 4 &= 6 \\ 2 + 4 &= 6 \\ 6 &= 6 \end{aligned}$$

Quiz

Directions: Find the value of x for equations of the form $ax = b$.

1. $1x = 6$ $x =$ ____________

2. $2x = -3$ $x =$ ____________

3. $-4x = -2$ $x =$ ____________

4. $16x = 4$ $x =$ ____________

5. $-3x = 12$ $x =$ ____________

Vocabulary

Directions: Study the words and definitions below.

adding the opposite — in solving equations, to undo addition add the opposite of the given integer (instead of subtracting)

equation — a statement of equality between two quantities

Example: ($5a + 2 = 12$)

isolate the variable — to work toward having the variable alone on one side of the equation

solve — to find all values which make an equation true

substitution — taking the place of another

Example: $5a + 2b + 3c$ when $a = 2$, $b = 3$, $c = 4$
$5(2) + 2(3) + 3(4)$

variable — a symbol, usually a letter, used to represent a number in an expression or an equation

Activity Sheet

Directions: Find the variable for equations of the form when $ax = b$.

1. $-5a = 10$ $x =$ ____________

2. $12b = 6$ $x =$ ____________

3. $3c = -2$ $x =$ ____________

4. $7d = -21$ $x =$ ____________

5. $-27e = 3$ $x =$ ____________

6. $-15f = 3$ $x =$ ____________

7. $-3g = -15$ $x =$ ____________

8. $24h = -8$ $x =$ ____________

9. $-2k = 12$ $x =$ ____________

10. $2m = 12$ $x =$ ____________

Activity Sheet

☞ **Directions:** Find the value for equations of the form $ax = b$.

1. $22x = 11$ $x =$ ____________
2. $-17x = 34$ $x =$ ____________
3. $-25x = 5$ $x =$ ____________
4. $-5x = -25$ $x =$ ____________
5. $-27 = 9$ $x =$ ____________
6. $3x = -27$ $x =$ ____________
7. $-45x = 5$ $x =$ ____________
8. $9x = -45$ $x =$ ____________
9. $3x = 2$ $x =$ ____________
10. $1x = 2$ $x =$ ____________

Activity Sheet

☞ **Directions**: Solve for the variable for equations of the form $a + x = b$.

1. $k + 17 = 9$ $x =$ ____________

2. $y + 21 = -11$ $x =$ ____________

3. $m + 18 = -57$ $x =$ ____________

4. $b + -13 = 14$ $x =$ ____________

5. $r + -15 = 43$ $x =$ ____________

Activity Sheet

☞ **Directions**: Solve for the variable for equations of the form $a + x = b$.

1. $z + {}^{-}3 = {}^{-}8$ $\quad z =$ ____________

2. $x + {}^{-}7 = 12$ $\quad x =$ ____________

3. $b + 4 = 17$ $\quad b =$ ____________

4. $x + {}^{-}4 = {}^{-}37$ $\quad x =$ ____________

5. $y + 27 = {}^{-}11$ $\quad y =$ ____________

6. $c + 11 = {}^{-}5$ $\quad c =$ ____________

7. $k + {}^{-}11 = {}^{-}21$ $\quad k =$ ____________

8. $a + {}^{-}7 = 8$ $\quad a =$ ____________

9. $p + {}^{-}5 = {}^{-}5$ $\quad p =$ ____________

10. $q + {}^{-}371 = {}^{-}371$ $\quad q =$ ____________

Activity Sheet

Directions: Find the value of x for equations of the form $ax + b = c$.

1. $x + 3 = 7$ $x =$ ____________

2. $2x + 5 = 9$ $x =$ ____________

3. $^{-}2x + 4 = 10$ $x =$ ____________

4. $5x + {}^{-}10 = 20$ $x =$ ____________

5. $2x + 2 = 7$ $x =$ ____________

Activity Sheet

☞ **Directions**: Find the value of x for equations of the form $ax + b = c$.

1. $9x + 9 = 36$ $x =$ __________

2. $5x + 4 = 10$ $x =$ __________

3. $16x + 2 = {}^{-}30$ $x =$ __________

4. ${}^{-}27x + 3 = 42$ $x =$ __________

5. ${}^{-}2x + {}^{-}5 = {}^{-}15$ $x =$ __________

Activity Sheet

Directions: Find the value of x for equations of the form $ax + b = c$.

1. $4x + 3 = 2$ $x =$ __________

2. $x + 2 = 7$ $x =$ __________

3. $3x + 4 = 6$ $x =$ __________

4. $2x + 5 = 9$ $x =$ __________

5. $2x + 2 = 4$ $x =$ __________

6. $18x + 3 = 12$ $x =$ __________

7. $6x + 2 = 9$ $x =$ __________

8. $3x + 9 = 30$ $x =$ __________

9. $14x + 2 = 28$ $x =$ __________

10. $2x + 1 = 5$ $x =$ __________

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